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**RIVERSIDE TEXTBOOKS
IN EDUCATION**

EDITED BY ELLWOOD P. CUBBERLEY

**PROFESSOR OF EDUCATION
LELAND STANFORD JUNIOR UNIVERSITY**

RIVERSIDE TEXTBOOKS IN EDUCATION

EDITED BY ELLWOOD P. CUBBERLEY

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TO
HENRY M. BRACKEN, M.D.
SECRETARY OF THE STATE BOARD OF HEALTH
FOR MINNESOTA



EDITOR'S INTRODUCTION

EDUCATIONAL HYGIENE has four chief divisions: (1) The Hygiene of Physical and Mental Growth; (2) Health Supervision in the Schools, including methods of health observation and teaching; (3) the Hygiene of Instruction; and (4) the Hygiene of the School Plant.

The first of these divisions has been treated by one of the authors of this book in *The Hygiene of the School Child*, which has appeared as an earlier number of this Series, and the third, by the same author, is in preparation. The fourth division is to be covered by another author, and is also in preparation.

The present volume deals with the problems involved in health supervision, health examination, and hygiene teaching, — in other words, with the second of the above divisions; and it is hoped that it will contribute materially to the standardization of health supervision and to the broadening of its scope. Every one must realize that a great amount of what goes by the name of "medical inspection of schools" can be called health work only by courtesy. All along the line, among superintendents, teachers, school nurses, school boards, and even school doctors, education is needed which will lend a broader vision to the purpose and possibilities of genuine health supervision. ✓

Special emphasis has been given by the authors to

the part played by the teacher in school health work. To this end, two chapters have been prepared (v and vi) for the purpose of assisting teachers in the observation of general health conditions among children, and three others (ix, x, and xi) for the purpose of acquainting them with the most important facts regarding those transmissible diseases which concern the school. Three additional chapters (xv, xvi, and xvii) are devoted to suggestions for the teaching of hygiene in the grades, and another chapter (xviii) discusses health conditions among teachers. It will be seen, therefore, that the book has been planned primarily for the use of the grade teacher, and with her needs especially in view, though it is hoped that it may also serve as a handbook for the guidance of superintendents, school nurses, and boards of education.

It is seldom that we have presented, by authors of such extended practical experience and large technical knowledge, a book on such a technical subject written in such simple language and presented in so attractive a manner.

STANFORD UNIVERSITY, CAL.,
May 6, 1914.

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Dr. Hoag — Chapters III, V, VI, IX, X, XI, XIV, and XV.

Prof. Terman — Chapters I, II, IV, VII, VIII, XII, XIII, XVI, XVII, and XVIII.

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HEALTH WORK IN THE SCHOOLS

CHAPTER I

SOCIAL RESPONSIBILITY FOR THE HEALTH OF SCHOOL CHILDREN

The spread of school medical work

THE health supervision of schools is not a passing fad. The conservation of the child is a problem which, like that of world peace, is bound to take possession of the minds of all humanitarian people. To the ethical principle of humanitarianism is added the stern counsel of biological laws, which teach us that an elaborate scheme of mental culture which proceeds without regard to the needs of the body is but a house built upon the sands.

It is significant for the future of the movement that with minor exceptions all civilized countries have almost simultaneously taken it up. Its universal development is inevitable. Progress has been remarkably uniform in different countries, though naturally there are some differences in the details of procedure and in the points of emphasis. Germany has forged ahead with her dental clinics and open-air schools; France, with her school lunches and vacation colonies; while England has set the whole world an example in the

earnest way in which she has undertaken to ameliorate the evils which medical inspection of schools has revealed. Our own country, on the whole, is behind most of the nations of Europe in the practice of school hygiene, but is making progress rapidly. But the doctor has not been brought into the school without opposition, and it is therefore desirable to inquire further into the justification for this new assumption of responsibility on the part of organized society.

Physical defects among school children

Serious defects of eyes, ears, nose, throat, lungs, teeth, glands, nutrition, heart action, nervous co-ordination, and mentality have been discovered with surprising frequency wherever they have been looked for. Statistics on these matters have been so indefinitely extended and (when we make allowance for certain differences in procedure) have given such uniform results, that we can safely say that in any school system, no matter where it may be located or to what social classes its patrons belong, from 50 to 75 per cent of its pupils are suffering from one or more physical defects serious enough to require skilled attention.¹

While it is not claimed that all this defectiveness is produced by the school, some of it undoubtedly is, and in the case of still other pupils the school is at least a partial cause. At any rate, it is well known that defective pupils are present in the schools in large numbers,

¹ Lewis M. Terman, *The Hygiene of the School Child*, chapter 1. Houghton Mifflin Co., 1914.

and that the defects are often unfavorable to a normal physical and mental development. Although many of the defects are curable or preventable, as a rule even intelligent parents and teachers either do not observe them or else they underestimate their seriousness.

*Parental guardianship of children's health not
sufficient*

If all parents were wise in regard to health matters, it would not be so necessary for schools to make a special study of the physical conditions of the children entrusted to their care. All that could then be fairly required would be the guaranty of a healthful school environment, including such things as good ventilation, correct methods of lighting and heating, sanitary plumbing, the control of contagious diseases, frequent recesses, sufficient physical training, and the proper sort of health instruction. But it is a fact and not a theory that not all parents possess the special knowledge which is necessary for the hygienic supervision of physical and mental development. Even intelligent parents may be unable to detect the early symptoms of physical disorder, just as they may be unable to decide upon the best methods or texts for teaching history or geography. They do not see the defects in their own children because they are used to them. Many are so superstitious as to prefer to treat adenoids by suggestion, others so ignorant as to interpret *pediculosis capitis* as a sign of good health. Plainly, therefore, it becomes the duty of the school department to furnish

not only a healthful school environment, but also a health guardianship over its pupils.

The responsibility of society

The children of to-day must be viewed as the raw material of a new State; the schools as the nursery of the Nation. To conserve this raw material is as logical a function of the State as to conserve the natural resources of coal, iron, and water power. To investigate exhaustively the evils which exist and to remedy all that may be remedied without transgressing unduly upon the jealous precincts of parental responsibility is a plain matter of duty. Theoretically, it matters little how the State performs this duty, whether by a house-to-house census of the children, or in some other way. Practically, however, there is no effective or convenient way except to do the work in connection with the public schools. In many of our best towns and cities the people themselves are demanding such supervision on the principle that it is one of the important functions of the public school system.

The argument that the health supervision of schools invades the rights of the home has exactly the same value as the corresponding argument against compulsory school attendance and prescribed courses of study. The school does not claim anything more than the right to make an examination of the child's physical and mental condition in order that the work of the school may be properly adjusted to his health and growth needs, and, further, to notify and advise

parents regarding such defects as are found to exist. This is not an unwarranted assumption of power. The responsibility for remedial action is left entirely with parents. The school has not undertaken forcibly to subject children to surgical operations, nor is there at present any legal method of compelling parents to perform their duty in this respect. We can invoke the law for wanton neglect of a broken bone, but there is no way to punish the neglect of discharging ears, adenoids, or astigmatism, any one of which may prove more serious in the long run than a fractured bone.

It is interesting to conjecture how far present practice in this respect is likely to be modified. Compulsory public education itself is so recent that only a few decades ago it was considered by a majority of people as a species of meddlesome paternalism. According to the old conception the child was the parents' child; if they questioned the value of an education there was no recourse in the child's behalf. There are a million or more illiterate adults in the United States to-day who are victims of this mistaken social theory. The theory, happily, has been discarded. We now know that the interests of society demand an elaborate scheme of educational processes under social control. Some time we shall understand, just as clearly, that the child's physical growth also stands in need of more expert supervision than the average parent is capable of exercising.

*The relation of the school medical service to private
medical practice*

It is sometimes contended that all medical work should be left in the hands of the family doctor, and that the employment of school physicians is both an ✓impertinence and a needless expense. The practicing physician himself often takes this stand, just as formerly private teachers resented the intrusion into their domain of teachers who were paid at public expense. The two situations are strikingly similar. There were private schools which afforded excellent educational opportunities, but unfortunately they did not reach all the people and they were excessively expensive. Similarly there are families who know enough about health and the causes which are likely to undermine it to seek the frequent advice of high-priced, skillful physicians. On the other hand, a large majority of families can hardly be said to have a family physician, and when they do his function seldom goes beyond the treatment of acute disease or physical injury. Under present conditions the family doctor institution hardly touches the rich field of preventive medicine with which it is the business of the school physician to deal. In the vast majority of cases, if the child's physical needs receive no expert oversight in the school, they will receive no expert attention at all.

It is, therefore, not at all a question of relieving the family physician of any of the functions he has been accustomed to exercise, but of doing the work he has

left undone. The practicing physician is not always present when needed. As a rule he does not appear on the scene until an emergency occurs. He has no commission to go out in quest of disease. He has little opportunity so to order the lives of his clients that they will escape emergencies. We refuse to pay him except to cure our diseases; it is unfair as well as absurd, therefore, to expect that his chief interest will be in the prevention of disease. The wonder is that the disparity between the physician's interest in disease and his interest in health is not greater. It is to the credit of the profession that the better class of practicing physicians almost unanimously indorse the work the schools have undertaken in child hygiene.

Other functions of school health departments

Apart from its contribution to national vitality, the health supervision of schools is entirely justified by its influence upon the efficiency of the school itself. For one thing, it appreciably affects regularity of attendance, which, as Ayres has shown, is one of the important factors in retardation. It does this by eliminating some of the causes of illness, and by treating in the school certain parasitic diseases and other slight ailments which otherwise would require exclusion. Ringworm and pediculosis, especially, have in the past caused a great deal of needless irregularity of attendance. Chronic physical defects, particularly of breathing and of nutrition, have a retarding effect on school progress, even when they are not of such a nature as to

cause absence. To the extent that health supervision of schools is successful in securing the medical or surgical treatment of defects, or in ameliorating environmental conditions in the home, it cannot fail to contribute to the solution of the retardation question.

In the prevention of epidemics the school department of health renders invaluable assistance to the local non-educational board of health. The latter is usually given authoritative control in such matters as closing the schools, granting permits to return after illness, etc., but the closer contact of the school health officer with the pupils often enables him to sound the alarm and in many ways to become a necessary ally in preventing the spread of infectious diseases.

Not the least important function of the school health department is that of coöperation with the school architect and sanitary engineers. Of the millions of dollars expended annually in the United States for school buildings, a large part, from the point of view of school hygiene, must be considered as almost wasted. School buildings erected earlier than twenty years ago belong usually to discredited types of architecture, and are being replaced rapidly by new and still more expensive plants. Unless these embody the very best ideas in sanitation and hygiene, they, too, will soon have to be replaced. There is no reason why the better class of school buildings erected to-day should not be well preserved and for the most part hygienic in the year 2000. It would be hard to overestimate the injury that may be wrought in three

quarters of a century by a poorly lighted, ill-ventilated, or unsanitary school building of twenty-five rooms. Within that time many thousands of children will have been subjected to its unwholesome influence. The resulting sickness, ill health, and death would appall us, if it were possible to estimate it.

The health department will also give immediate returns in the hygienic supervision of school activities. Competitive athletics, for example, are always dangerous without such control, particularly below the college age. Likewise the hygiene of instruction presents a promising field of research that can best be carried on by official investigation supported by the school itself. There is hardly a limit to the number of hygiene researches which it would be feasible for the school to undertake.

Furthermore, the department of health would give valuable assistance to the teaching corps in hygiene teaching. At present hygiene is one of the least taught, and probably also the worst taught, of all the branches of the curriculum. This is largely because the teachers themselves have been poorly instructed in the subject. The work of the health department in this respect is twofold: (1) It will give the teachers themselves systematic instruction in the hygiene of physical and mental development, so that they may coöperate intelligently with the work of the department; and (2) it will aid the teachers in the choice of subject-matter and in the methods of presenting hygiene lessons in the schools.

Finally, health supervision in the schools will contribute to the conservation of the teacher's health. This has been fully presented in chapter XVIII, and need not be dwelt upon here.

The reaction of school health work upon the home

But, supposing that all defects have been discovered, and that school life goes on without aches and pains, must we go all over the work next year and the next, forever? Is the social mill to go on, indefinitely, grinding out diseased and crippled children by the thousands? The most hopeful approach to this problem lies in the schools themselves. By all means let us remedy defects when they exist, but, in addition, let us endeavor to prevent defects from occurring. The school must investigate the home conditions of defective pupils. It must know more of the child's habits, what time he goes to bed, how long he sleeps, how much he works, how much he studies at home, what he eats, what he drinks, where and under what conditions he sleeps, and what the home environment is in every particular that concerns the child's health. If we read the lesson of the *health index* aright, it means not only sick school children, but sick school buildings and sick homes as well. The health of the child reflects the health of the community in which he lives.

The surest means of increasing community health are: (1) by increasing the health of the child through improved school conditions, and by attention to his physical defects; (2) by teaching the child sensible, ap-

plicable health lessons; (3) by carrying the influences of this health improvement and health instruction into the home.

The public school has not fulfilled its duty when the child alone is educated within its walls. The school must be the educational center, the social center, and the hygienic center of the community in which it is located, — a hub from which will radiate influences for social betterment in many lines.

Opposition to school medical work

Thus far the opposition to health supervision in the schools comes from three chief sources. One of these is the misconception as to the purpose of the work which is likely to be entertained by the more ignorant people of a school community. At first such people are likely to become panic-stricken with the foolish notion that their children may be subjected to some strange kind of violence, forcible surgical attention, hypnotism, etc. As the school health officer becomes a more familiar figure about the school premises, and as his kindly interest in the children becomes known, this fear always disappears.

The two other sources of opposition are harder to eradicate, because founded on prejudice rather than ignorance. These are the Christian Scientists, and the League for Medical Freedom.

The tenets of the former are so well known that they need not be discussed here. It is well to note, however, that the attitude of Christian Scientists toward school

health work is not always unfriendly where the purely advisory capacity of the school doctor is understood. On the other hand, where the school authorities, in their communications and notices to parents, are at all insistent in their efforts to bring about the correction of defects, the enmity of this religious sect is likely to be aroused. Notwithstanding certain hygienic principles in Christian Science, its sweeping warfare against medicine must be viewed as the conflict of an absurd superstition with the welfare of the State and its children. Superstition has had to yield to quarantines and to state laws which punish parental neglect in case of acute and immediately dangerous diseases. Here, also, it will have to adjust itself as best it can to the march of science, which, at last, is beginning to question the right of either parental or religious authority to interfere with the health or safety of the child.

The League for Medical Freedom is a less worthy, but a more active and dangerous, opponent of child hygiene measures. This is a recently founded and vigorous organization composed largely of "sectarian" physicians, quacks, and patent-medicine vendors, whose main purpose seems to be to oppose all social restraints on medical practice and to preserve the divine right of all kinds of practitioners, regular and irregular, to prey upon the gullibility of the people. In the short time since it was organized, it has in several cases successfully opposed the extension of school medical inspection, and has defeated progressive legis-

lation on matters relating to hygiene and medical practice generally.

Its methods are always and everywhere the same — to prejudice the minds of those not alive to the real issue by the cry of “medical tyranny,” “political doctors,” “sacred rights of the family,” etc. Teachers will not be deceived by catchwords of this sort, enlisted in the cause of the patent-medicine industry and quack schools of “healing.” Teachers are intelligent enough to scent the insincerity in the argument that medical inspection is being fostered for the special benefit of a particular “school” of medicine, — the allopathic *versus* the hydropathic, homœopathic, osteopathic, naturopathic, etc. It is well for teachers to understand that real medical science is not torn asunder by separate schools, any more than is the science of chemistry or physics. There is only medical science on the one hand, and quackery and superstition on the other.

All such opposition will gradually be dissipated, or at least silenced. Medical inspection, enlarged to include all phases of school hygiene, will soon be looked upon as a mere matter of course, — the logical and necessary correlate of compulsory education.

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- See *Collier's Weekly*, June 3, 1911, for an exposé of the "League for Medical Freedom."
- See all standard works on school hygiene or medical inspection of schools.

CHAPTER II

THE SCOPE AND ADMINISTRATION OF HEALTH SUPERVISION

Stages in the development of school health work

THE health supervision of schools presents three clearly defined stages in its development: —

(1) Its original purpose in almost every case was the detection of contagious disease. The work was merely an extension of that of the local board of health, and was designed to protect the community from epidemics. The value of such inspection immediately became evident.

(2) The second stage is represented by the extension of the scope of the work to include examinations for non-contagious physical defects. The early surveys of the Danish and Swedish commissions had demonstrated an enormous prevalence of defectiveness among supposedly normal children of both sexes and of all ages and classes. It was discovered that many of these defects have a bearing upon the child's school progress, and upon his physical development. It was observed, moreover, that many of them are easily curable or removable. About two hundred cities in the United States, mostly the larger ones, have undertaken to give their school children complete examinations for all kinds of physical defectiveness.

(3) The third stage passes beyond "medical inspection," as such, and becomes a distinct field of preventive medicine. A suitable name for it is "Health and Development Supervision." Its keynote is the cultivation of health and the prevention of defectiveness by the hygienic supervision of all the school activities.

This phase of child hygiene, the most important of all, is just in its beginning. Health supervision has been too narrowly conceived, but we are coming to realize that almost everything which contributes to the conservation of the child belongs within its scope. The schools, instead of causing sickness and defectiveness, must be made to preserve the child from many kinds of morbidity, repair his already existing defects, and combat his hereditary predisposition to illness and the unfavorable conditions of his social environment.

In order to prosecute the work intelligently hundreds of researches will have to be made; researches to which the public schools must be freely thrown open, and for the support of which public funds should be appropriated. Out of the data from such investigations there will rise, gradually, a new science of educational hygiene which will go as far beyond the usual poverty-stricken courses in "school hygiene" as medical science now transcends the teachings of the eighteenth-century medical school.¹

The broad scope of educational hygiene is made clear in the following outline, which is a modifica-

¹ See *Popular Science Monthly*, 1912, pp. 289-97.

tion of the comprehensive suggestions of Louis W. Rapeer.¹

THE DIVISIONS OF EDUCATIONAL HYGIENE

I. *School sanitation.*

- A. School sites, hygienic aspects.
- B. School architecture, hygienic aspects.
- C. Ventilation and humidification.
- D. Lighting.
- E. Heating.
- F. Drinking-water and fountains.
- G. School baths.
- H. School cleaning.
- I. School toilets.
- J. Seating.
- K. Decoration.
- L. The standard schoolroom.
- M. Janitor service.

II. *Physical education.*

- A. Playgrounds and play.
- B. Athletics and "leagues."
- C. Physical training.
- D. Correctional exercises.
- E. Posture.
- F. Recreation.
- G. School excursions, "tramps."
- H. Physical development examinations.
- I. Gymnasiums and gymnastics.
- J. Swimming and bathing.
- K. Medical gymnastics.
- L. Social center work for adults.

III. *Health teaching.*

- A. Choice of hygiene texts.
- B. Health instruction topics.

¹ The authors are indebted to Dr. Louis W. Rapeer for permission to include this valuable outline in the present volume. No one else has made such a thorough study of efficiency in school-health service as Dr. Rapeer.

- C. Health habits.
- D. Public and personal hygiene.
- E. Health education of parents.
- F. Feeding and clothing of children.
- G. Health education of teachers.
- H. Home hygiene, in domestic science.
- I. Industrial hygiene, in industrial work.
- J. First aid and avoidance of accidents.
- K. Talks by doctors, nurses, and specialists.
- L. Pupil's coöperation in medical supervision.
- M. Health leaflets.

IV. *The hygiene of instruction and of mental development.*

- A. Fatigue.
- B. School program.
- C. Home study.
- D. Examinations.
- E. Type of books.
- F. Motor aspects of teaching.
- G. Cheerfulness and calmness.
- H. Part time or whole time.
- I. Vacations and their influence.
- J. Teaching through play.
- K. Attention and inter-recitation recreation.
- L. Preventing pathological conditions.
- M. The hygiene of discipline.
- N. The hygiene of classification, promotion, and gradation.
- O. The hygiene of mentally exceptional children; the nervous, the feeble-minded, etc.
- P. The hygiene of the learning process, habit formation, etc.

V. *Medical supervision.*

Each of the above divisions should have its special texts, and its special courses in teacher's colleges and normal schools. Space is lacking to show in detail the contents, aim, and procedure for each division, but

this will be done for Division V, Medical Supervision. The following outline, based upon Rapeer's conclusions from his valuable comparative study of medical supervision in twenty-five American cities, reveals the scope and procedure for one of the five divisions given above:—

OUTLINE OF THE SCOPE, PROCEDURE AND ADMINISTRATION OF MEDICAL SUPERVISION

A. *Officials.*

1. General director of the department of hygiene.
2. Medical examiners.
3. Nurses.
4. Oculists, dentists and surgeons at school clinics and dispensaries.
5. Teachers, principals, and superintendents.
6. Physical-training teachers.
7. Board of health.
8. Sanitary inspectors.
9. Health lecturers.

B. *Phases of work of medical supervision.*

1. Preliminary working together of all doctors and nurses, with teachers present as much as possible for standardization.
2. Inspections.
 - a. September room inspection of all pupils.
 - b. Occasional room inspection by nurses.
 - c. Individual inspection by teachers and nurses, teachers to refer suspicious cases with help of symptom chart. Nurse to inspect, also, all pupils absent for three or more days, and entering pupils. Doctor to make individual inspection of urgent cases.
 - d. Home-hygiene inspection by nurses. Recorded on pupil's health-record card.
 - e. Sanitary inspection of school. By superintendent of school or representative: doctor,

nurse, principal, business manager, or sanitary inspector.

3. Examinations — Complete physical, annually, for pupils.
 - a. Medical — only such phases by the doctor as the nurse cannot do well.
 - b. Vision, hearing, teeth, scalp, skin, — by the nurse.
 - c. Height, weight, chest-expansion, and other measurements, *if required* — by nurse, physical trainers, or principals.
4. Cure and correction.
 - a. Treatments by the home through school advice and family physicians.
 - b. Treatments by school nurses and clinics.
 - c. Follow-up work in getting or keeping up treatment.
 - d. Prescriptions for simple, common ailments, so far as safe, in the language of the people.
 - e. Getting coöperation of dispensaries, boards of health, etc.
 - f. Testing efficiency by cures and improvements.
 - g. Health-budget exhibits, and other means of health education.
5. Central office where parents may bring children for special examinations and for consultation, including psychological tests.
6. Prevention.
 - a. Good ventilation, fresh-air or open-air rooms or schools.
 - b. Summer inspection by nurses, at playgrounds and summer schools.
 - c. Special inspections, to prevent epidemics.
 - d. Improved instruction of pupils and parents in hygiene.
 - e. Coöperation with health and recreation agencies.
 - f. Daily inspection, by nurses.
 - g. Testing efficiency by decrease of ailments and defects.

- h.* Efficient supervision of doctors and nurses.
- i.* Limiting medical inspectors largely to examinations.
- j.* Coördinating all phases of educational hygiene.
- k.* Continued home-hygiene inspection.

C. *Records and reports.*

1. Individual, cumulative health-record card.

- a.* The central instrument of medical supervision, as nurse is the central agent.
- b.* Should provide for entire health record, including inspections, examinations, and records of cures and improvements.
- c.* Should have the good features of the Cleveland, Ohio, the Meriden, Connecticut, and Dr. W. S. Cornell's cards (and, perhaps, those of the New York City card for both health and scholastic record).
- d.* May be kept in the classrooms for teachers' constant reference and carried by pupils to inspection or examination.
- e.* Doctor's findings on the twenty or more examination cards daily should be left for the nurse to report, before cards are returned, to the rooms. Doctor may be relieved of most clerical work, if results are supervised, thus saving time.
- f.* To distinguish, nurse should make records on cards in *red* ink, doctor in *black*.
- g.* State or national cards should be adopted.

2. Nurse's daily or weekly report.

- a.* The best type is probably that of the weekly report of the nurses in the Philadelphia schools.
- b.* Nurse reports number and results of doctor's examinations, as well as her own.
- c.* Reports should be summarized weekly, and printed in newspapers.
- d.* A standard classification of school ailments should be used.
- e.* Simplest classification is, *infectious* and *non-*

infectious, using common names in alphabetical order. The former may be divided into parasitic and infectious diseases, the latter into physical defects and common ailments. General divisions, such as communicable and non-communicable diseases, are desirable.

3. Annual report to the people.

a. Should be detailed, and yet comprehensible to the public.

b. It should show how many cases were *found*, how many *cured*, *improved*, found *not needing treatment* by family physician, and by what agencies cared for. The number, not cured, treated, or improved, is a most necessary part of efficient reporting. Adequate reporting in this field has not been worked out by any city.

4. Other records, notices, reports, exclusions, etc., need be little different from those in vogue. (Records should lead to a frequent *health invoice*.)

D. *Standardization.*

1. Examinations.

a. Medical, by the doctor (medical examiner) if there is one.

X. Number, 7 to 10 an hour, say twenty in a two-hour day when there are no exceptional cases, or about one hundred a week.

Y. Depending upon the district and the amount of consultation by nurse and individual inspection of referred cases, the doctor can examine medically from 1500 to 2000 pupils in the 180 days of the usual school year. (Minimum.)

Z. In the nurse-alone plan, one nurse can examine from 800 to 1200 pupils in the year and do her other work of home visiting and inspection, varying greatly with nurses and communities.

b. Scholastic or anthropological.

X. Vision tests, about three minutes each. Snellen's charts. Vision less than twenty—twenty referred only when there are bad symptoms of eye-strain, otherwise twenty—forty. Strabismus (cross-eye) should always be referred for treatment.

Y. Hearing tests, about two minutes each—twenty an hour, at least. By nurse or physical trainer. Stop-watch and whisper tests. Common sense about the only standard yet.

Z. Height, weight, and chest-expansion measurements, if required, about three minutes each. Of little value as usually taken. Rarely used, even when well taken with pupils stripped.

2. *Inspections.*

a. September room inspections, — about forty an hour, nurse and doctor working in separate rooms with help of teachers.

b. Nurse and doctor should be conservative about referring cases and excluding pupils, even in case of threatened epidemic.

c. Sanitary inspection of school, standardized by a special report card such as used by the Philadelphia Board of Health (devised by the Bureau of Municipal Research).

d. Nurses and doctors should be given schools in groups, or along good lines of travel.

3. *Efficient supervision, and occasional working together on a number of referred cases by all doctors and nurses, highly desirable for purpose of standardization.*

E. *Expenditures.*

1. For nurse: five and a half days a week (8.45 to 5 each school day), with the responsibility of inspection, not less than \$70 a month, preferably for twelve months.

2. For doctor: two hours spent in a single school each

day, making a reasonable number of careful medical examinations, forty hours a month, about \$60 to \$80 a month for ten months. Where more is paid it is a question whether it would not be better to use the money for a good nurse on full time. Physical examinations cannot be carried on more than two or three hours a day, because of the physical strain. Neither can physicians be taken for long from their regular practice each day. To employ all for full time is out of the question. Diminishing returns bring in the nurse, often more competent for the simple school troubles to be referred to parents and family physicians, than is the school doctor.

3. Supervisor of the Department of Hygiene: \$3000 to \$4000 a year, for full time.
4. Supplies: depending upon conditions, although certain standard supplies can be designated. Newark, New Jersey, has a good list. This phase of the work varies greatly in different cities.
5. Free treatment: Amount of free treatment is rapidly increasing in the larger cities. While using care, this work must be greatly extended.

School medical inspection still suffers from lack of standards. Too often a narrow view prevails regarding the opportunities and responsibilities which the work involves. As stated by Rapeer, "the public demand for more attention to the health of school children has often been met by such temporizing sedatives as the hiring of some doctors to look into the school buildings occasionally when they have time; having manufacturing companies send in a few samples of sanitary drinking-fountains or adjustable desks; or permitting the park department to station a young woman with a see-saw and a swing on some school-yard 'playground' during the summer."

It is with the hope of broadening the scope of health work in the schools and contributing to the standardization of its methods that the above outline has been presented. The authors believe that it cannot be too carefully studied, either by school boards, superintendents, school doctors, or teachers.

Method of control

This was one of the earliest questions to arise. Medical inspection everywhere began as an extension of the work of the already existing board of health. However, the more the scope of health supervision has been extended, the greater the tendency has been to doubt the wisdom of this method of control. Three leading objections have been made: —

(1) The board of health is almost certain to place the emphasis too much on the mere prevention of disease. Insidious defectiveness and the causes leading up to it are likely to be overlooked;

(2) The board of health is not in a position to make such adjustments of the educational processes as may be necessary to minister to the health and growth needs of the pupil. Attempts to do so inevitably lead to conflict between the board of health and the educational authorities, or at least to misunderstanding with consequent failure to coöperate;

(3) When the work is administered by the non-educational machinery, the interest of the teacher is not so easily enlisted. The bifurcated educational aim which has wrought such havoc in education for hun-

dreds of years becomes through this system of divided responsibility more strongly intrenched than ever. The school looks after the child's mind, the board of health after its body. Everybody forgets that the child is a psychophysical organism and that any dual system of educational control is sure to violate this unity.

It cannot be too often repeated that the examination of pupils for contagious disease is a relatively unimportant part of the health supervision of schools. Statistics show that as a rule not more than 4 per cent of the pupils of a school system need to be excluded in one year. On the other hand, 60 per cent of the pupils suffer from non-contagious defects which need constantly to be taken into account by the educational authorities. Moreover, the physical welfare of every child is more or less jeopardized by the sedentary occupations, indoor life, and nervous strain of the modern school. The task of the school department of health is so to direct the educational processes that the child's native heritage of vigor and health may be fully attained, and his hereditary deficiencies, in so far as possible, made good. This is an educational problem. It is one that is not likely to be effectively dealt with except through the administrative authority of the school. On the other hand, communities so conservative as to be content with the earlier type of "medical inspection" may very well leave the work to non-educational authorities.

✓ By 1911 over three fourths of the cities in the United

States supporting health supervision had lodged the administration with the board of education, so that we may now consider educational control one of the standard requirements of health supervision, and the best guaranty of broad and effective coöperation along all lines of child hygiene in the schools.

It cannot be denied, however, that in a few instances splendid work has been carried on in the schools by the board of health, and in a few instances narrow, unsatisfactory work by the educational authorities. Much depends upon the man behind the system. If all officers of public health had an adequate comprehension of the strictly educational and preventive aspects of hygiene in the schools, there would be less to choose in the matter of control. But as the situation now stands, there can be no question that, generally speaking, the health supervision of schools in this country ought to be conducted by educational departments of health. There should be such departments in every city school system, in every county also for the benefit of rural and town schools, and above all a State department for the coördination and standardization of the work.

Division of power

Granting that such a department of health exists, what relations shall it sustain to the superintendent and to the teachers? Shall it act only in an advisory capacity, or may we safely charge it with a certain amount of administrative authority? To be concrete,

let us suppose that the health department decides that a given pupil cannot safely attend school more than three hours per day. Let us suppose also that the superintendent of schools and the child's teacher disagree with this opinion. In such a case whose judgment should legally prevail? Similar questions are likely to arise occasionally in regard to excusing a pupil from gymnastics, and in regard to the segregation of children in special classes for open-air treatment, etc.

It seems clear that the decisions of the department of health should at least not be subject to reversal by any other authority than the board of education or superintendent, and it is an open question whether the superintendent should have this power. School hygiene is a technical field, where only expert opinion is reliable. Because the hygienic affairs of the school require expert direction, the board of education creates the health department for this purpose, just as it creates other offices for the supervision of instruction. The expertness of the department should, therefore, be respected. Deficiency of a child's blood in oxygen-carrying material, or a retarded condition of his skeletal development as indicated by the Roentgen rays, or an excessive predisposition to fatigue, — these are matters which call for expert diagnosis and expert treatment no less than measles or diphtheria.

Practically, however, there ought to be few cases of conflict, wherever the ultimate control is vested. The sensible medical director will find that he must work through the superintendent and the teachers. If he

conscientiously gathers his data and cautiously bases his recommendations upon a reliable body of ascertained fact, and if he presents these recommendations with reasonable tact, there will ordinarily be no difficulty in securing favorable action on the part of superintendent and board of education. On the other hand, if the medical director is incautious or unscientific in his recommendations, if he is intemperate in his condemnation of current school practices, or if he meddles unduly with the work of instruction, the efficiency of his department is certain to be impaired. The school department of health should have no place for the man or woman who is temperamentally unable or unwilling to coöperate harmoniously with other educational authorities.

Records

The practical value of the work of the department of school hygiene depends intimately upon its book-keeping methods. Too often the methods in use fail to give us the information we need. The following are some of the faults which have helped to render the statistics of medical inspection confusing, contradictory, and sometimes misleading: —

(1) Stating the absolute number of defects found without indicating the number of children furnishing them. What a community wants to know is not that School A has fewer defective eyes than School B, but the relative percentage of defective eyes in the two schools.

(2) We should also be informed what the percentage is a percentage of; whether of total enrollment, or of a representative portion of the enrollment, or of a portion specially selected by teachers or nurses for suspected defects.

(3) Another common mistake is to fail to distinguish between the number of examinations made and the number of children examined. Since many children receive frequent examinations, the two sets of facts do not even approximately correspond.

(4) Still more serious is the failure of the general report to differentiate sufficiently among kinds of defects. The common and the extremely rare, primary and secondary, curable and incurable, chronic and temporary, the very grave and the unimportant are all lumped together. This leaves us without data for arriving at reliable conclusions as to the influence of the various kinds of defectiveness upon mental development or upon the child's school progress. In such an ill-considered system of records, a slightly decayed temporary tooth, about to be replaced by a permanent one, counts for just as much as an extreme case of myopic astigmatism or a discharging ear. Hunchbacks and boils are not distinguished. Again, one defect, by counting all its symptoms, becomes three or four. By one system of records a child may be accredited with two defects and by another system with eight or ten, without necessarily implying any essential difference in the expertness of the examinations themselves. Defects which are plainly temporary should be care-

PHYSICAL RECORD

HEALTH RECORD OF

SEX: M.-F, BORN:

SCHOOL YEAR	1		2		3		4		5		6		7		8		9		
	E	R	E	R	E	R	E	R	E	R	E	R	E	R	E	R	E	R	
EXAMINATION AND RESULTS																			
DATES																			
General Appearance																			
Nutrition																			
Nervous Disorder																			
Eyes																			
Ears																			
Nose																			
Throat																			
Teeth																			
Skin																			
Heart																			
Lungs																			
Neck Glands																			
Vaccination																			
Visits of Nurse																			
Reply to Notice																			

NOTE:— †-Normal. C.-Corrected. E.-Examination. --Not Normal. N.-Not Corrected. R.-Result. P.C.-Partially Corrected.

fully distinguished in reports from those which are chronic; likewise the curable from the incurable. These factors help to determine what action the school shall take regarding notification of parents, and in adapting the work of the school to the child. What we most want to know is how the many kinds of defectiveness are related to each other, to school progress, to age, and to mentality.

(5) The pupil's individual record card is not less important than the general report, and is subject to much the same faults. It should be explicit and not vague. In recording a defective ear, for example, it should distinguish between partial deafness and a discharge. Eyes should be recorded separately, and objective tests for eye-strain should be listed, apart from general symptoms. If glasses are worn, the fact should be noted, together with the date of their purchase and with record of the visual acuity with them on. Squint should be designated explicitly. Explicitness should be the rule. At the same time the record should not be encumbered and rendered misleading by the over-conscientious insertion of data pertaining to slight and unimportant ailments. (See page 31.)

(6) Having an ideal individual record card, what shall we do with it? Some medical directors bury their work alive by filing it away in a distant central office. If a teacher wants to know the facts about the health of one of her pupils, she will have to make a trip to this office. Needless to say, under this kind of system, teachers and supervisors cannot be expected to know

much about the health conditions of their children. The card should always accompany the pupil throughout his course by being transferred to each of his successive teachers. If the central office can afford to have a copy, well and good. If there is only one card, there ought to be no question as to where it belongs.

Schools and publicity

The school does not always court full publicity. School reports give little information as to the real efficiency of a school. They are too likely to give all the lights and none of the shadows. They are sometimes shameless advertisements of the superintendent or the school board. The private individual who shows an interest in facts not officially revealed may be accused of enmity and suspected of acting from personal motives. The following are some of the matters concerning which American school authorities do not give sufficient information: —

(1) The amount of retardation and elimination in all the grades.

(2) The intra-school and extra-school causes of such retardation and elimination as exist.

(3) The efficiency of the school, as measured by its actual grade performances. Here, instead of any attempt at stating objective facts, the board of education may lay claim to having the "most efficient school system in the State." In the West this is changed to the "best in the United States."

(4) The hygienic imperfections of its school build-

ings are seldom plainly and explicitly stated. When the evil is too crying to permit absolute silence, such statements as are allowed to appear lose all flavor of truthfulness either through vagueness or fragmentariness. The schoolroom which has one third the standard amount of light, and which investigation would probably show to have an excessive amount of eye defect among its pupils, will at most be reported as "somewhat deficient in light," etc. School authorities do not tell us what school buildings are supplied with air dryer than the air of Sahara. They do not tell us anything about the relation of colds, influenza, etc., to the ventilation and warming of school buildings, nor do they enlighten us very materially in regard to the methods of sanitation which they employ.

(5) Lastly, as we have already seen, they tell the public very little about the physical conditions of the children, and still less about the relation of one defect to others or to school and social environment.

Not even schools can remain permanently exempt from publicity. For the very reason that public education is the institution of most vital concern to the entire population, those who control it are morally obligated to afford publicity of all the facts which concern it. The more intimate or unpleasant the facts the deeper is this obligation. Sooner or later, this ideal is certain to take possession of us. The campaign for publicity in matters of public concern will not stop at the threshold of the school, and we shall do well to prepare

ourselves for it by studying a little the methods of scientific management.

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CHAPTER III

PLANS FOR ORGANIZATION FOR HEALTH WORK

State versus local control

ALTHOUGH the development of health work in the schools has been very rapid, much remains to be done to make it as effective as it ought to be. Its greatest weakness lies in the absence of standardized direction and procedure. With regard to it the most divergent beliefs and practices prevail.

The logical place for the oversight of such work is the State, though almost everywhere in the United States city action has preceded state action. For the State to assume general responsibility for school health work would only be in line with other extensions of the State's interest in the welfare of its children, including state laws for vocational education, state uniformity in textbooks and courses of study, state support for secondary schools, etc.

State action in matters relating to school hygiene is desirable for two important reasons: (1) it sets standards for the conduct of the work which insure that it will be, on the whole, much better done than is the case when each community is left to work out its own methods blindly; and (2) it is the best and only guaranty that backward communities will not neglect

such matters altogether. In the absence of mandatory state laws, rural schools almost never enjoy the requisite hygienic oversight, either as regards school buildings or the children themselves.

By 1912 some twenty States had passed laws providing for the medical inspection of schools, but in only nine cases are the laws mandatory. Even where the law is mandatory, the details of method and procedure are too often left to the initiative of the city, county, or school district, so that most of the benefits which would accrue from responsible state departments of health supervision are not enjoyed.

Examples of state departments

In August, 1912, the State of Minnesota organized, for the first time in the United States, a "State Division of Health Supervision of Schools." The work was undertaken by the State Board of Health, with the coöperation of the State Department of Public Instruction.

A Director of School Hygiene was appointed whose duties were as follows: —

(1) To visit towns and cities desiring aid in the promotion of school health work.

(2) To maintain a clearing-house of information in matters pertaining to school and child hygiene, at the offices of the State Board of Health.

(3) To offer lectures on general topics of school and child hygiene to teachers' institutes, and other organizations desiring them.

(4) To conduct short courses on child hygiene at each of the State Normal Schools.

(5) To carry on investigations in matters pertaining to school and child hygiene.

(6) To publish and circulate information to schools, pupils, and parents on subjects relating to the promotion of health among school children.

(7) To maintain an exhibit of school hygiene, at the offices of the State Board of Health.

(8) To maintain a bureau of information in respect to available school medical officers and school nurses.

The general program of the director at each place visited was as follows: —

(1) A general meeting with all the teachers of the local school system, at which were explained methods for the physical observation of school children. At these meetings practical demonstrations (or school clinics) were given, with one or more grades of school children present, usually a fourth or fifth grade. (See chapter vi for a stenographic report of one such clinic held.)

(2) Individual demonstrations in various grades in different schools.

(3) Examination of special cases, including mentally defective children.

(4) A second meeting with all the teachers for the purpose of discussing the results of the examinations.

(5) An open meeting devoted to the interests of parents of school children.

(6) Sanitary inspection of school buildings and premises.

(7) Organization of the study of mentally deficient children.

(8) Recommendations for health promotion addressed to the board of education, and adapted to the conditions discovered.

The University of Virginia, in coöperation with the State Board of Health and the State Department of Public Instruction, has organized a plan somewhat similar to that of Minnesota, and it is safe to say that in a comparatively short time state organization and standardization of school and child hygiene will be undertaken by most of the progressive States of the Union.

However maintained, provided only the work be vigorously and sanely prosecuted, the State Department of Child Hygiene is sure to be of incalculable benefit. It hastens the progress of health supervision not only by persuading school authorities to establish it, but also by standardizing the procedure so as to insure efficiency. By influencing legal and educational control it would in many cases save years of needless and discouraging experimentation. Such a department should organize and prosecute State-wide investigations of child hygiene, in the broadest sense, including infant mortality, mental retardation, juvenile criminality, the hygiene of mental activity, etc.

In the organization of such departments it is de-

sirable that the work be broadly conceived, so as to bring within its scope as many aspects of child hygiene and child welfare as possible. Research should be vigorously prosecuted along all lines of mental and physical deviation, and should look especially toward methods of amelioration and prevention. There should be sub-departments for the hygiene of instruction, mental retardation, preventive mental hygiene, etc., each with specially trained assistants in charge.

City organization of school health supervision

Most of the larger cities of the country have taken up the work in some fashion or other, without reference to state action. By 1898, Boston, Chicago, New York, and Philadelphia had inaugurated systems of medical inspection. About 90 cities had followed the example by 1907, 337 by 1910, and nearly 500 by 1913.

This wave of activity has resulted in (1) a few well-developed City Departments of School Hygiene; (2) many partially developed undertakings; and (3) a desire, on the part of many smaller cities, to undertake some kind of health supervision in an inexpensive way, without the employment of school physicians.

In order to indicate some of the best plans for health work in schools, and in a measure to furnish standards which may be successfully put into operation, three distinct plans of organization for school health work are here set forth, devised to meet varying conditions,

such as are sure to exist in different places. The three plans are as follows: —

(1) Organization with one or more medical officers, and a nurse or nurses.

(2) Organization with a school nurse or nurses only.

(3) Organization by the employment of a simple non-technical *health survey* on the part of the teachers only. Such a survey is provided by a series of questions based upon ordinary observations of physical and mental conditions.

In the present chapter, Plan (1) is set forth in a general way, and in the appendix the organization in five typical cities is described. Plan (2), supervision by nurses only, is described in chapter iv; and Plan (3), health grading by teachers, in chapters v and vi.

PLAN (1): PHYSICIANS AND NURSES

A physician should be selected who has some special interest in and adaptability for work with school children. In addition to this he should have made some special study of school hygiene, since medical colleges unfortunately do not usually include such courses in their curricula.

Whether the medical officer shall give part or all of his time to this work will depend largely upon the duties required of him. In communities where the number of school pupils does not exceed 4000 to 6000, it is possible for one well-trained school doctor to render satisfactory service by devoting one half of his time to the work, provided he has as assistants at

least two well-trained nurses who possess special adaptability for this kind of work.

In places of from 8,000 to 12,000 school population, it is best to have one physician give his entire time, and an assistant physician give half-time. In such places there should be employed at least three or four school nurses.

In places where the school pupils exceed 12,000, one may estimate an additional half-time school medical officer and from one to two full-time school nurses for each 6,000 increase in the number of pupils. For a city the size of Los Angeles or Indianapolis, this would mean from twelve to twenty school nurses.

Many will say that this is an inadequate force for so large a number of pupils, and gauged by absolute perfection this may be true. But it must be remembered that school systems have many practical adjustments to make, and that this is actually a larger force than schools now employ.

The plan presupposes preliminary examinations on the part of nurses and teachers, after the manner suggested in chapter v. This method relieves the medical officers from much purely routine examination of practically normal children, and allows them to concentrate their attention on children really needing expert services. With the methods employed at present, school doctors waste a great amount of time doing purely inexpert work, which might far better be done by teachers and nurses. At present most cities are in this way paying experts for inexpert service.

When a city is large enough to require the services of several medical officers in the schools, the following plan is suggested and recommended as the most efficient one:—

There should be one general director, giving his entire time to the work. Instead of employing several half-time physicians as his assistants, fewer men on whole time are recommended. The organization might be made up as here indicated for a city of, say, 60,000 school children:—

One Chief Health Director.

One General Medical Officer.

One eye, ear, nose, and throat specialist.

One specialist in mental and nervous diseases, who is also experienced in psychological methods.

One emergency physician.

One woman physician in charge of high-school girls.

One dental specialist.

This number (seven) would take the place of the twelve physicians under the usual plan in vogue, and, with appropriate increase in the number of school nurses, would result in better work in every respect.

Such a plan would require a central office of several rooms; namely, one general reception-room; one private office for the director; one examining-room; one laboratory equipped with medical and psychological apparatus. There should be a dental and medical clinic, either in connection with the schools (and this is preferable), or, if this seems impossible to arrange, then in connection with some other organization.

With this plan in operation, parents of defective children would have the opportunity of taking their children to the central office for special examinations. The different specialists would keep office hours on different days of the week, and could thus give careful and deliberate attention to such school children as required it. From this office, cards of admission to the medical or dental clinics could be issued to those entitled to them. One special school nurse should be assigned for duty at the central office, whose duty it would be to keep the records and assist the physician in the examination.¹

The cost of health supervision by Plan (1)

The expense of a system providing for competent health supervision of about 50,000 school children would probably fall somewhere between \$18,000 and \$25,000 annually for equipment and for salaries of physicians and nurses. If the scope of the work is enlarged by the addition of one or more psychologists, and by extensive use of clinics for free treatment, the cost would be proportionately greater.

The importance of adequate salaries deserves special emphasis. We frequently hear of a medical officer giving half-time, examining thousands of children

¹ For the benefit of those specially interested in school health organization, the plans of health supervision in five representative cities of the United States are presented, in some detail, in Appendix I. Special attention is called to the organization in Milwaukee. See also Rapiér's *School Health Administration* for work in twenty-five representative cities.

in a school year, and receiving for his services a pittance of \$200. It should go without saying that whatever public service is worth having is worth paying for. Until salaries of health supervisors are placed on a better footing it is useless to expect the kind of service that is most needed.

Costs are large or small relatively to other costs. The annual money loss to the people of the United States due to their ignorance and carelessness of the laws of hygiene has been conservatively estimated at not less than \$2,000,000,000. It is probably a good deal more than that. The annual cost from tuberculosis alone is not less than \$500,000,000. Our calculation takes no account of impaired efficiency due to alcoholism or other vicious habits, undue fatigue, minor ailments, and general lack of expert direction of the human machine, nor does it try to place a money value upon grief and moral suffering resulting from preventable sickness or death.

If the kind of health supervision here suggested were established in every city and county of every State in the Union, the annual cost would not exceed \$5,000,000 to \$10,000,000, or less than half of one per cent of our annual loss from sickness, physical inefficiency, and premature death. In passing we may also note that this sum is about equal to the cost of one warship; to one sixtieth of the money cost of the alcoholic beverages consumed annually in the United States; or to one fortieth of our annual expenditure for tobacco.

It is, of course, not claimed that child hygiene in the schools can prevent all of the losses due to preventable sickness, but there can be no doubt that it would save many times more than half of one per cent of them. Through education its effects would become cumulative. It is not unreasonable to suppose that in the long run the annual returns would amount to fifty times the annual cost. Compared to other educational expenditures the cost cannot be considered large. The elementary and secondary schools of the United States are supported by an annual expense of nearly \$450,000,000. If ideal health supervision were made universal, this amount would have to be increased only to the extent of about one or two per cent. Stating it in another way, the public at present is willing to expend, and does expend on an average, about \$35 annually in the mental and moral education of one of its children. If it also undertook the hygienic supervision of the child's growth and development the amount would be about \$35.50. Health supervision for the child's whole elementary school life would be about \$3 to \$4. A progressive city of 300,000 people and 45,000 school enrollment expends over \$125,000 for salaries of superintendents, assistant superintendents, and supervising principals, who themselves do no teaching. It could at least afford to expend one fifth of this amount for health supervision and hygiene investigations.

CHAPTER IV

THE SCHOOL NURSE: INCLUDING SUGGESTIONS FOR HEALTH SUPERVISION BY THE "NURSE ALONE" PLAN

Spread of school nursing

ONE of the latest and best additions to our educational forces is the school nurse. Perhaps no other educational movement, not even excepting medical inspection itself, has spread with more rapidity or has met with such unanimity of support.

School nursing had its beginning in England. In 1894 a district nurse was asked to visit a London school attended by poor children, to help to relieve their ills. In 1898, a voluntary "School Nurses' Society" was founded with the idea of extending the work, as a result of which three nurses were appointed. In 1904, when the work of the London School Board was taken over by the London County Council, and reorganized, the number of nurses was increased to 12, and still later to 50. Other cities of England, large and small, speedily followed the example of London, and school nursing is now being carried into the rural districts.

In the United States it was not until 1903 that the movement can really be said to have begun. In that year New York appropriated \$30,000 for the purpose,

and appointed 27 nurses to assist the Board of Health in the medical inspection of schools. By 1907, eight cities in the country had school nurses, and by 1910 nearly eighty. Of these 71 per cent are located in the Northern States. Boston, with its force of 25 school nurses, supported at an annual expense of \$25,000, is an excellent illustration of what progressive American cities are doing in this line. New York City, at the time this is written, has 176. In all parts of the country the number is increasing with great rapidity. Special provision for the employment of school nurses is now made in the medical inspection laws of several States.

Nurses necessary for follow-up work

Medical inspection rendered the school nurse inevitable. When the doctor was brought into the schools, he faced a new and tremendously difficult situation. The school doctor's helplessness has been vividly described by Dr. Hayward, of England, as follows: —

As a doctor I felt quite stranded in the strange atmosphere of an elementary school, coming into contact, not so much with actual illness, as with the primary conditions which produce and foster it. Dirt, neglect, improper feeding, malnutrition, insufficient clothing, suppurating ears, defective sight, verminous conditions, the impossibility of getting adequate information from the children or a knowledge of their home conditions; and nobody to whom one could give directions or who could help in examining the children. The only means of approaching the parents was to send an official notice that such or such a condition required treatment. My duties began and ceased with endless notifications, and there it all stopped, as very little notice was taken of them.

This has been the experience everywhere. Without an effective follow-up service, conducted by visiting nurses, medical inspection is ineffective. Until 1908, New York City relied upon a postal card notification sent to parents of defective children, and was able to secure action in only 6 per cent of the cases where treatment was recommended. Immediately upon placing the follow-up service in the hands of school nurses the percentage increased to 84. This brought treatment to nearly 200,000 additional pupils. The following chart shows the difference in the results

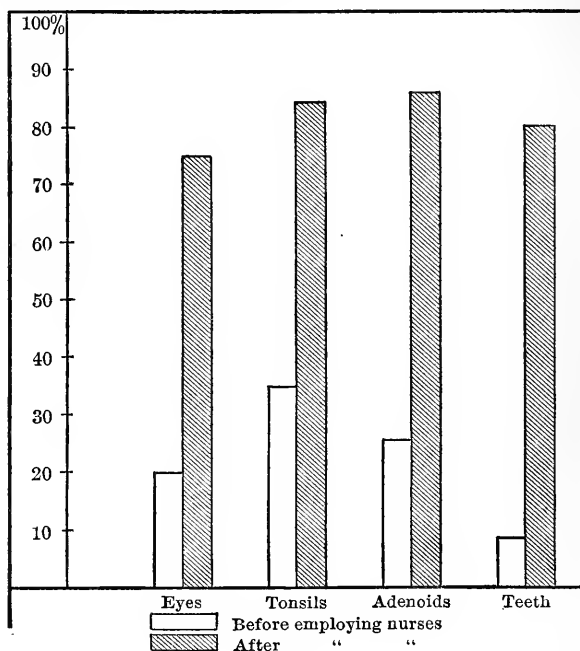


FIG. 1
Percentage of recommendations acted on in Philadelphia.

obtained by a given medical inspector in Philadelphia after the addition of a school nurse to his staff. In each case the height of the first column shows the percentage of recommendations acted upon by the parents before the employment of the nurse; the second column after her employment.

In a majority of cases parental neglect spells ignorance. The postal card notification is a poor educational device. The nurse goes into the home and by tactful presentation of the child's case effects what no other agency could accomplish. She not only secures action in the case at hand, but she becomes a permanent advisory influence in the homes where she visits. She does what the iron hand of law could not do. We can hardly imagine any kind of legal machinery, devised for compelling parental treatment of children's defects, which would succeed in as large a percentage of cases as does the school nurse.

School nurses reduce absence

In the second place, medical inspection without school nurses is always a costly tax on attendance. Children with scabies, impetigo, pediculosis, etc., are sent home by the thousand, to mingle on the street with other children after school hours, beyond the control of the school and without effective treatment. Where diseases of this kind are either treated by the nurses at school or by the parents after her instruction, exclusions are usually reduced to 5 or 10 per cent of the number previously necessary. In New

York City the reduction was from about 10,000 to about 1000 per month. In a quarter of a school year exclusions were enforced in New York as follows:—

Measles.....	18	
Diphtheria.....	140	
Scarlet fever.....	13	
Whooping-cough.....	61	
Mumps.....	13	
Chickenpox.....	172	
Trachoma.....	1264	} Nearly all these exclusions preventable by school nursing.
Pediculosis.....	3994	
Skin diseases.....	661	
Miscellaneous.....	1823	

Over 95 per cent of the above exclusions would have been prevented by the school nurse. By her ministrations and instruction in the home these diseases of filth and neglect are almost eliminated. As expressed by Jane Addams:¹—

The best of medical inspection succeeds only in sending the child home; they say that such and such a child would have a bad effect on the other children, and therefore he is sent back to the family physician for treatment. In most cases a family physician is not called in, because, in the words of Artemus Ward, "there ain't none"; and therefore the child is kept out indefinitely, and the public school, so far as that child is concerned, is doing nothing, and the child continues to play in the alley and on the street or sit in the doors of the tenement with the rest of the children. This is the whole idea—that medical inspection was succeeded and almost transposed by the addition of the visiting nurses. The medical inspection got the child out of school, and the visiting nurse got the child back. It seems almost foolish to have medical inspection without the visiting nurse.

¹ *Am. J. Nursing*, 1908.

Other functions of the school nurse

By virtue of her room to room visitation and her opportunities for observation, the school nurse also becomes the ideal sanitary inspector. She notes temperatures, ventilation, seating, cleanliness of room, toilets, blackboards, and the clothes of children. Her hospital standards of sanitation tend to follow her into the schools.

In special schools for the tuberculous, crippled, or anæmic children, the school nurse is indispensable. She records body temperatures, supervises the diet, the sleep, and the play of the children, and advises continually with parents, teachers, and doctors. In some such schools her constant presence is as necessary as in the hospital ward.

Again, the school nurse becomes an invaluable assistant in the teaching of hygiene to pupils. Every pupil ought to have more expert instruction on such subjects as home-nursing and first aid in emergencies than the average teacher can be reasonably expected to give. This deserves a special place in the seventh and eight grades. In the matter of sex hygiene, too, the school nurse can give much personal advice and instruction to the older girls. As has been pointed out by Miss Stewart,¹ the nurse, more than almost any other social worker, sees the dreadful havoc wrought by ignorance of the laws of sex. She becomes vividly

¹ *Ninth Year-Book of the National Society for the Scientific Study of Education*, p. 5.

impressed with the necessity of such teaching as will supply to young girls the power and motive for self-protection. Girls are willing to consult her the more readily because they realize that this is an everyday subject with her.

Influence of school nurses upon the home

The school nurse, like the municipal district nurse, is first and last a social worker. Important as are her duties in the school, her ministrations and educative influence in the home are more valuable still. She instructs ignorant but fond mothers in the best methods of feeding, clothing, and caring for their children. She is received in their homes as no other official visitor could possibly be. Mothers are quick to detect the genuineness of her interest in their children, and are often ready to follow with blind faith any instructions she has to offer. At her advent in a tenement or street, the mothers not infrequently crowd eagerly around her, plying her with questions and bringing their babies for inspection. The school nurse is thus a potent factor in diminishing infant mortality. In short, Dr. Osler does not overstate the case when he says that the visiting nurse is "a ministering angel everywhere." In many a family she becomes a spiritual adviser, not only pointing out inadequate sanitation which keeps them sick, but also educating them on the folly of cut-throat chattel mortgages, unnecessary furniture purchased at ruinous prices on the installment plan, the short-sighted



SCHOOL NURSE RECORDING PULSE AND TEMPERATURE IN AN OPEN-AIR CLASS

From Kingsley's "Open-Air Crusaders," by permission of United Charities of Chicago.

policy of taking children prematurely out of school to work, etc.

All of this is especially important in the Americanization of the more ignorant foreign-born population. As stated by Dr. Darlington, of New York City: —

In all large communities, the poorer element of the foreign-born population presents the greatest problem encountered in municipal health work. Diversified in their habits, often superstitious and resentful of any interference with their mode of life, oppressed by poverty, frequently ignorant or neglectful of the simplest sanitary requirements, their assimilation as citizens of their adopted country comes only as result of education — persistent, inclusive, and never-ending. In public health work this education is brought about by various means. Lectures, printed instructions, and publicity in all its forms are used, but the most valuable and effective form is found in individual instruction in the home. Personal efforts, advice, instruction, and demonstration offer the most practical and effective means, and we have found the employment of trained nurses for this purpose of inestimable value.

That the visiting nurse is a good economic investment is evidenced by the fact that some of the large insurance companies, such as the Metropolitan Life of New York City, find it to their advantage to employ a number of them to visit the homes of policyholders for the purpose of giving instruction in matters of hygiene. Department stores and factories also find it good business to employ nurses to look after the health of their employees and to teach them personal hygiene. The visiting nurse is a "health nurse."

Number needed

The number of school nurses needed varies somewhat according to social conditions, and according to the range of duties expected of them. We find all the way from 1,000 to 10,000 children under the care of one nurse. In New York City each nurse has from two to seven schools, with a total attendance of about 4000 children. In Philadelphia five schools and about 5000 children are usually allotted to one nurse, while in Boston the proportion of nurses is almost twice as great. Nor is it at all demonstrated that the point of diminishing returns has yet been reached in the number employed. It is not improbable that the ratio will be increased until it reaches an average of one nurse for each 1000 of the school enrollment. If there were one nurse for every 2000 pupils, about 10,000 would be required in the entire United States. A nurse's room, completely equipped, is coming to be regarded as one of the essentials in every school building of eight or more rooms.

Thus far the institution of school nursing has not spread to rural communities in the United States, though it has done so to a certain extent in England. This cannot be attributed to any lack of need, but only to the greater expense and other obstacles incident to a more scattered population. As our country districts become more densely populated, and as they resort more often to school consolidation, the nurse will here, also, become a necessary part of the school force.

Equipment needed by school nurses

With such an extensive scope of duties, opportunities, and difficulties, it at once becomes evident that both the personal qualities and the professional training of the school nurse are matters of great importance. She must be quick to understand every class and condition of people, patient, sympathetic, and tactful. All agree that tact is absolutely essential. She must be simple, direct, concrete, forceful, convincing. Her business is not to entertain, but to get things done, and she must therefore be persuasive as well as pleasing.

On the professional side, besides having a good high-school education and a complete course in a nurses' training school of recognized standing, she should have had some months of additional experience in a children's hospital. She must also know something of education, child psychology, general hygiene, nutrition, infant mortality, child-welfare movements, domestic sanitation, and certain legal matters. If she has had previous experience as a district nurse or as a teacher, so much the better. Good health and willingness to work are of course taken for granted.

With the rapid multiplication of school nurses the desirability of special professional training for them will become more obvious. Teachers College, Columbia, has already introduced a one-year course for this purpose, designed to follow the usual two-year train-

ing for nurses. Courses of this nature will no doubt be established at an early date in other teachers' colleges, and perhaps also in connection with medical schools. The school nurse has proved her worth to the most skeptical, but her usefulness can be greatly enhanced by the requirement of a professional training which gives special attention to problems of school hygiene.

A PLAN FOR THE HEALTH SUPERVISION OF SCHOOLS BY NURSES ALONE ¹

This plan is adapted to places which are unable, or think they are unable, to procure expert medical service in schools. It has been amply demonstrated that well-trained nurses are able to accomplish extremely useful results, even without the direct aid of medical supervision. The plan has been in successful operation in Alameda, California, since 1911, and is soon to be established at Ely, Austin, Cloquet, Owatonna, and a number of other towns of Minnesota.

Properly trained nurses are able to detect most of the physical handicaps of school children. Such nurses have no difficulty in discovering common defects of the nervous system, eyes, ears, throat, teeth, skin, and lymph glands of the neck. They can usually detect the presence of adenoids and note disorders of nutrition, as well as observe defective postures. About

¹ This is the second plan for school health supervision, mentioned on page 42, chapter III.

the only points of importance which they ought not to attempt to cover in their examinations are those which pertain to certain special conditions requiring exact diagnosis. These would include the heart, lungs, special diseases of the skin and nervous system, and some of the unusual contagious diseases of childhood. Certainly more than 90 per cent of the usual defects of school children will be observed by the rightly trained school nurse, and this plan will inevitably justify itself and gradually lead to more thorough organization with medical service.

According to Dr. R. C. Cabot, of the Harvard Medical School, the school nurse comes to excel the young doctor in detecting the first symptoms of infectious disease. The results of nurse inspection in Boston prove her efficiency in this line. Under the inspection of doctors and teachers the average number of cases of scarlet fever discovered annually in the schools was 14. In 1908, the school nurses found 1000 cases. Where the doctors and teachers had found an annual average of 86 cases of measles, the school nurses discovered 2285! This disparity in efficiency, however, is in reality a disparity between nurses and teachers, as previous to the introduction of nurses the physicians had examined, for the most part, only those children sent to them by the teachers as suspects.

The following communication is from Louis W. Rapeer, who has made an exceptionally thorough study of the results of medical inspection in about forty American cities: —

I have come to the tentative conclusion that many schools do not need physicians, and that a great deal would be gained, and little or nothing lost, by employing experienced school nurses for each group of 1000 to 1800 pupils. New York City, as well as other cities, has proved that school nurses can inspect for contagious diseases. Canton, Massachusetts, also has shown that only the nurse is needed.¹

Physicians for less than one hour a day cost about half what nurses cost for full time, five and a half days a week. A school nurse when trained, one who has the study habit, can also make the physical examinations and record the findings on a history card for each pupil, especially for defects of ears, eyes, nose, mouth, throat, skin, scalp, malnutrition, and nervousness, — about 97 per cent of all. Nurses very much lessen professional jealousy among the doctors; get far better response from children and from parents; get cures, the great object of medical supervision; open the eyes of teachers to the symptoms of ailments and defects; follow up better the children they themselves examine; coöperate better with women's clubs, dentists, dispensaries, and oculists; get back the truants and absentees; keep down impetigo, lice, and infant mortality in the summer; distribute literature on the cure and prevention in the homes; and in general are on the job all the time as a life-work, not as a perfunctory side issue. Three hours each morning for inspection and 20 examinations; afternoons for inspection and home visiting — about 1000 to 1800 children.

Occasionally physicians object to allowing school nurses to make health examinations or to treat cuts, bruises, sores, and the like. The tendency, however, is to the extension rather than the restriction of their duties. There is no reason why physicians should view this with apprehension since the nurse's work

¹ See Dr. Arthur Cabot's article in *The Physicians and Surgeon's Journal* for May, 1911, and the September, 1911, report of the Bureau of Municipal Research, 261 Broadway, New York.

finds its natural limitations without any need for artificial restriction.

In every instance where nurses are employed to make the examinations of pupils, one or more physicians ought to be available for special consultation in questionable and unusually important cases.

The hearty coöperation of teachers will also be required in this scheme and they ought to make use of an outline of health grading, such as that presented in chapter v.

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CHAPTER V

THE HEALTH GRADING OF SCHOOL CHILDREN BY TEACHERS ¹

THE GENERAL IMPORTANCE OF THE TEACHER'S COÖPERATION

The coöperation of the teacher

THE effectiveness of any system of health supervision in the schools depends in large measure upon securing the intelligent and willing coöperation of the teachers. The more prominent the preventive aspect of the work done, the more important this becomes. A large part of the doctor's advice has to be acted upon finally, if at all, by the teacher. She is the only person in constant attendance upon the pupils. She has even larger opportunity than the school nurse to detect the first symptom of contagious disease in the school. It would be well if normal schools afforded to young teachers a more satisfactory training in school hygiene. They would then be able to coöperate more intelligently in the management of all kinds of atypical children, — the precocious, the mentally defective, the incorrigible, the physically defective, the timid, the quarrelsome, the stuttering, the neurasthenic, etc.

¹ This is the third plan for the health supervision of schools mentioned on page 42, chapter III.

The teacher's part in molding the health habits of pupils is equaled by that of no other agency. It devolves upon the teacher to cultivate habits of posture which will prevent spinal curvature and myopia, and habits of physical activity which will help to counterbalance the effects of sedentary life and ward off disease. It is her duty to impart the knowledge of hygiene and ideals of correct living which will function throughout life as the cheapest form of health insurance and the most effective protection against immorality and vice. The responsibility of the school for the child's health does not cease with the close of school life.

Besides assisting the physician, with records and other routine work, teachers are also frequently charged with the testing of vision and hearing. This practice has become especially common in the United States. At present legal enactments in many States, including Colorado, Connecticut, Indiana, Maine, Massachusetts, Minnesota, and Utah, provide that sight and hearing tests be made by the teacher, and such tests are the custom in probably a majority of American cities. To a less extent this has been done also in England and Scotland.

Teachers vs. physicians

Physicians sometimes oppose this extension of the teacher's work into a field which they regard as one that should be reserved for a higher degree of expertness than the average teacher can be expected to

possess. Some of the best oculists and aurists in the country, however, have taken the other view. Indeed, it has been largely due to the influence of such specialists themselves that these routine examinations have been so generally entrusted to teachers and nurses. In 1906, when the legislature of Massachusetts was considering a mandatory provision by which vision and hearing were to be tested by teachers, sittings were held during which a mass of evidence as to the feasibility of the plan was offered by some of the best-known specialists of the State. Tests of the kind here referred to can be made by any one who is competent to teach. It is not claimed that the teacher can assume the expert functions of the oculist or aurist, and the making of sight and hearing tests does not require that they should do so. It is claimed, and is now fairly well recognized, that they are at least as capable of making tests of the special senses as is the physician who is not also a specialist. It should be stated, however, that, wherever this policy is followed, the intention is to have examinations made by specialists in all cases where defects are apparently revealed by the teacher's test.

Teachers should have special instruction and practice to aid them in reading the health index of the child for all the common diseases and defects.

The contribution that can rightfully be expected from teachers in all these lines depends in part upon the size and efficiency of the school nursing corps. In general, the more nurses the less it will be neces-

sary to require of the teachers. This applies especially to the detection of contagious diseases and physical defectiveness, first-aid work, follow-up service, etc. But the responsibility of conducting the activities of the school in such a way as to transgress as little as possible the fundamental laws of hygiene is one which the teacher can never wholly shift. Any scheme of medical inspection or health supervision which does not succeed in enlisting the interests and enthusiastic support of the teachers fails in one of the most fundamental requirements.

AN OUTLINE FOR THE HEALTH GRADING OF SCHOOL CHILDREN BY TEACHERS

Health supervision of schools, must in many places, at present, be delegated largely or entirely to teachers, a fact which we cannot ignore. For this special work, however, very few teachers, or even nurses, have received adequate training.

In order to help meet this condition as it exists in the schools, the following *Outline for a Health Survey of School Children* is suggested. Its use will succeed not only in largely removing the usual obstacles to health supervision in a community, but even where such obstacles do not exist, the plan when put into operation will, it is believed, greatly assist those engaged in the health care of children in the schools.

The plan consists of two parts: —

I. An outline for a partial health survey to be made

by the aid of the pupils themselves, or, in the case of young children, by the aid of parents.

II. An outline for a more extensive health survey on the part of teachers (or nurses). Whether a medical officer and nurse are employed, or not, does not much affect the plan; although, of course, any scheme for health supervision in schools will succeed best where competent, specially trained professional service is available.

The answers to these questions on the part of pupils or their parents will furnish some very definite information in respect to physical and mental conditions, and prove valuable to every teacher. The answers under Part II will stimulate and encourage observation on the part of the teacher and will also supply a very considerable amount of useful information which may serve as a basis for practical hygiene teaching. With the employment of this survey, no school need wait for the appointment of a medical officer before beginning some effective health work with school children.

In making the survey the teacher may take her own time. If it is completed in a room of twenty to forty pupils in a month or six weeks, it will be quite satisfactory. Any teacher will be able to accomplish it without feeling that she is imposed upon. After a pupil's health survey is made, a notice should be sent to the parents in those cases where physical difficulties appear to exist. This notice may be very general and noncommittal in character, and should always be

signed by the principal of the school. Such a notice has been successfully employed in the following form:—

To the Parent of.....

The teacher of this child has reason to believe that he is suffering from physical defects, serious enough to need attention. An examination by your family physician or dentist is, therefore, advised.

For further details you are invited to call at the office of the Principal at any time you may find it convenient.

Very sincerely yours,
Principal of _____ School.

A health survey carried out in the manner suggested will result:—

- (1) In overcoming most of the prejudice against physical examinations of school children.
- (2) In educating the public in matters of child hygiene and preventive medicine.
- (3) In largely solving the question of expense.
- (4) In the discovery of probably 90 per cent of the urgent cases of physical defects.
- (5) In considerably decreasing the wear and tear on the teacher.
- (6) In considerably increasing the children's health, happiness, and efficiency.
- (7) In serving as a useful preliminary examination for a medical officer of schools so that he may know where to concentrate his attention.
- (8) In giving positive information in respect to the kind of hygiene teaching which is most needed.

The significance of all the answers obtained by the

use of the questions in the health survey may not at first be appreciated by the teacher or other person without medical training, but experience and a little study will gradually make this matter plain.

PART I OF HEALTH SURVEY

Questions to be answered by pupil or parent, or by pupil with aid of the teacher

NAME. *Mae* SCHOOL..... DATE.....

Question 1: How old are you?

Answer: *2*

Question 2: What grade are you in?

Answer: *9-10*

Question 3: Have you ever had any serious sickness? What was it?

Answer: ;

Question 4: What do you usually eat for breakfast?

Answer: ;

Question 5: Do you eat breakfast every day?

Answer: ;

Question 6: Do you eat a noon meal every day?

Answer: ;

Question 7: Do you drink coffee? How much?

Answer: ;

Question 8: Do you drink tea? How much?

Answer: ;

Question 9: Do you have your bedroom window open or shut at night?

Answer: ;

Question 10: Have you ever been to a dentist?

Answer: ;

Question 11: Do you own a toothbrush?

Answer: ;

Question 12: Do you use a toothbrush?

Answer: ;

Question 13: Do you sometimes have toothache?

Answer: ;

Question 14: Do you have headache often?

Answer: *No*

Question 15: Can you read easily what is written on the blackboard?

Answer:

Question 16: Does the print blur in your book?

Answer:

Question 17: Do you often see double?

Answer: *Yes*

Question 18: Do you ever have earache?

Answer: *Yes*

Question 19: Do your ears ever run?

Answer: *No*

Question 20: Can you hear easily what the teacher says?

Answer: *Yes*

Question 21: Is it hard for you to breathe through your nose?

Answer: *No*

Question 22: Do you have sore throat often?

Answer: *No*

Question 23: Do you tire easily in school?

Answer: *No*

Question 24: Do you work any out of school hours?

Answer: *Yes*

Question 25: What kind of work?

Answer: *Hard work*

Question 26: How much?

Answer: *Whole lot*

Additional optional questions

Question 27: What time do you go to bed?

Answer:

Question 28: What time do you get up?

Answer:

Question 29: Does any one else use your toothbrush?

Answer: *Yes*

Question 30: Do you eat candy every day?

Answer: *No*

Question 31: How often do you bathe?

Answer: *Three*

Question 32: Do you often take cold?

Answer: *No*

PART II OF HEALTH SURVEY

Questions to be answered by the teacher or nurse

	Yes	No
<i>A. General appearance</i>		
1. Is the child healthy appearing?.....		
2. Is his color good?.....		
3. Is he physically well developed?.....		
4. Is he free from apparent deformities?.....		
5. Has he a good standing posture?.....		
6. Has he a good sitting posture?.....		
7. Are the shoulders even?.....		
8. Does the child walk normally?.....		
9. Are the two sides of the shoe heels worn evenly?.....		
10. Is the physiological age of the child apparently equal to his chronological age?.....		
<i>B. Mental conditions</i>		
1. Is the child normally advanced in school?..		
2. Is he mentally alert?.....		
3. Does he answer ordinary questions intelligently?.....		
4. Does he play normally?.....		
<i>C. Nervous conditions</i>		
1. Is the child good-tempered?.....		
2. Is he free from abnormal emotion?.....		
3. Does he have good powers of muscular coördination?.....		
4. Is he free from spasmodic movements?.....		
5. Is he free from the nail-biting habit?.....		
6. Does he speak without stammering?.....		
7. Is he free from pronounced peculiarities such as irritability, timidity, embarrassment, cruelty, moroseness, fits, general misbehavior, etc.?.....		
8. Is he apparently free from bad sexual habits?		

	Yes	No
9. Is he free from so-called "bladder trouble" (requests to "go out")?.....		
10. Is he usually free from headache?.....		
<i>D. Teeth</i>		
1. Are the teeth clean?.....		
2. Are the teeth sound?.....		
3. Are the six-year molars in good condition?		
4. Has the child been to a dentist within six months?.....		
5. Are the teeth regular?.....		
6. Does the child use a toothbrush every day?		
7. Are the gums free from abscesses?.....		
8. Are the gums healthy-looking?.....		
9. Are the upper teeth straight (not prominent)?		
10. Have decayed teeth been filled?		
<i>E. Nose and throat</i>		
1. Does the child breathe with the mouth closed?		
2. Is he free from chronic nasal discharge?....		
3. Is he free from "nasal voice"?.....		
4. Has he a well-developed face?.....		
5. Has he a well-developed chin?.....		
6. Has he straight, even teeth?.....		
7. Is the child mentally alert?.....		
8. Is he usually free from sore throat?.....		
9. Is the hard palate wide (not high and narrow)?		
10. Is the hearing good?.....		
11. Does the child breathe quietly?.....		
<i>F. Ears</i>		
1. Does the child usually answer questions without first saying "what"?.....		
2. Is he fairly attentive?.....		
3. Is he fairly bright appearing?.....		
4. Does he have a voice which is not monotonous and not "expressionless"?.....		
5. Does he spell fairly well?.....		

	Yes	No
6. Does he read fairly well?.....		
7. Is he free from earache?.....		
8. Does he hear a watch tick as far as the average child?.....		
9. Is he free from ear discharge?.....		
10. Is he free from any peculiar postures which might indicate deafness?.....		
<i>G. Eyes</i>		
1. Are the child's eyes straight?.....		
2. Is he free from chronic headache?.....		
3. Does he do his work without fatigue?.....		
4. Is he free from squinting or frowning?.....		
5. Is the child free from postures which might indicate eye defects, such as leaning over too near the desk, holding the head on one side, etc.?.....		
6. Are the eyes free from corneal ulcers or scars?		
7. Are the eyes free from redness and discharge?		
8. Are the eyelids healthy-looking?.....		
9. Can the child read writing on the board from his seat?.....		
10. Have the eyes been tested separately with the Snellen Test Type?.....		
<i>H. Communicable diseases of the skin</i>		
1. Is the head free from any signs of disease (lice, ringworm)?.....		
2. Is the skin of the face, hands, wrists, forearms, and chest free from red, somewhat circular patches (ringworm)?.....		
3. Is the skin of the face, hands, and forearms free from infected spots with crusts and pus (impetigo)?.....		
4. Is the child free from red, scratched lines and spots on the hands, wrists, forearms, chest, and between the fingers (itch)?.....		

I. Eruptive children's diseases

The following points often indicate the early signs of transmissible diseases in children. They will not ordinarily be observed, of course, at the time of making this health survey:—

	<i>Yes</i>	<i>No</i>
1. Flushed face.....		
2. Lassitude.....		
3. Vomiting.....		
4. Eruptions.....		
5. Congested eyes.....		
6. Discharging eyes.....		
7. Nasal discharge.....		
8. Persistent coughing.....		
9. Scratching.....		
10. Aches and pains.....		
11. Sore throat.....		
12. Headache.....		

BLANK FOR SUMMARY

Physical Development.....	
Nervous System.....	
Nutrition.....	
Mental Condition.....	
Eyes.....	
Ears.....	
Nose.....	
Throat.....	
Teeth.....	
Skin.....	
Eruptive Disease.....	
Food.....	
Ventilation of Bedroom.....	
Coffee Habits.....	
Tea Habits.....	
Home Habits.....	

ABBREVIATED CARD FORM OF A TEACHER'S HEALTH SURVEY OF THE SCHOOL CHILD

NAME..... SCHOOL.....

GRADE..... AGE.....

DATE.....

	Yes	No
1. Have you ever been in a grade more than one year?.....
2. Have you ever had any serious sickness?.....
3. Do you feel strong and well now?.....
4. Do you eat breakfast every day?.....
5. Do you eat a noon meal every day?.....
6. Do you drink coffee?.....
7. Do you always have your bedroom window open at night?.....
8. Have you been to a dentist within a year?.....
9. Do you have toothache often?.....
10. Do you own a toothbrush?.....
11. Do you use your toothbrush every day?..
12. Do you have a toothbrush of your own?
13. Do you have much trouble with headache?.....
14. Can you read writing on the blackboard from your seat?.....
15. Does the print in your books run together or look dim or crooked?.....
16. Do your eyes hurt after reading a good while?.....
17. Do you sometimes see two letters or two lines instead of one?.....
18. Do you often have earache?.....
19. Do your ears ever run?.....
20. Can you always hear the teacher?.....
21. Do you go to bed by nine o'clock?.....
22. Do you go to bed by ten o'clock?.....
23. Do you bathe at least once every week?..
24. Have you ever been vaccinated?.....
25. Have you ever had smallpox?.....

Remarks :—

This child has had the following diseases at the age indicated below: —

Chickenpox	when	years old	Whooping-cough	when.....	years old
Diphtheria	“	“ “	Pneumonia	“	“ “
Measles	“	“ “	Typhoid fever	“	“ “
Tonsillitis	“	“ “	Smallpox	“	“ “
Mumps	“	“ “	Tuberculosis	“	“ “
Scarlet fever	“	“ “	Infantile paralysis	“	“ “

SUGGESTIONS FOR USING THE OUTLINE FOR HEALTH GRADING

1. Call the pupils, one at a time, to the desk. Begin with Part I, and ask the questions as they appear in the Outline and write the answers yourself. One can get a great deal of information by noticing the manner in which the pupil answers the question. Mistakes in answers may often be corrected in this way, when they would not be observed if the pupil were to answer the questions himself in his own writing at his seat. Do not *suggest* the answer.

2. In asking questions about headache and earache, or any other questions where the word "frequent" appears, use the word "frequent" as meaning once a week or oftener.

3. Be perfectly sure that the pupil understands the question, and test his answer in a number of different ways where you have any reason to doubt the reply given.

4. It is desirable to have the Outline for Health Grading completed for every pupil in your room before the arrival of the visiting physician.

5. After the completion of the health grading in your room, make a list of the pupils who you think ought to receive further examination by a physician or nurse. Where only the minor difficulties are discovered it is not necessary to call the attention of a physician to these points, although it may sometimes be necessary, by means of the blank no-

tice, to inform the parents of what you discover. Do not place any pupils on the list to be examined by a physician unless you have a definite reason for doing so.

6. Make a list of all the retarded pupils in your room, and of this number indicate those whom you suspect of being mentally deficient.

THE SIGNIFICANCE OF THE ANSWERS TO THE QUESTIONS OF PART I OF THE OUTLINE

The answers in Part I will furnish information on the following points: —

1. Retardation.
2. Influence of previous sickness on present condition.
3. Relation of home habits to individual health.
4. Condition of the teeth.
5. Condition of the eyes.
6. Condition of the ears.
7. Condition of the nose.
8. Condition of the throat.
9. Amount of work done out of school.
10. Food habits.

Defective teeth

If a child in the third grade or above has never been to a dentist, it is presumptive evidence in most cases that his teeth are defective. Testimony of aching teeth always indicates defective teeth; sound teeth never ache.

In nearly every room it will be noted that several pupils make use of a family toothbrush. Nothing could more effectually spread disease than this practice.

School.....

Date..... 191....

Name.....

Address.....

Age.....Grade.....Room No.....

Condition of Mouth Good Fair Bad

Condition of Gums Good Bad

Use Toothbrush ? Yes No

Teeth Filled ? Yes No

Mal-occlusion ? Yes No

REMARKS :—

.....

.....

.....

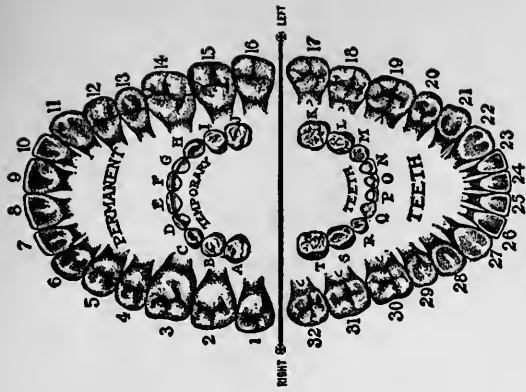


FIG. 2. TEETH DIAGRAM

Explanation of Marks on Diagram.

Line through tooth means cavity or cavities.

O—Loss of crown. X—Permanent tooth lost.

Practically every school disease that we know about is spread by the secretions of the nose and throat. This clearly indicates the danger from the use of the common toothbrush.

Chronic-headache

Chronic headache in school children is usually caused by one of the following conditions: —

1. Eye-strain.
2. Indigestion.
3. Constipation.
4. Auto-intoxication, or absorption of the products of fermentation from the intestines.
5. Decayed teeth.
6. Bad ventilation at home, or at school, or both.
7. Malnutrition.
8. Adenoids.

While there are some other causes of headache, they are so infrequent as to be negligible here. Of the above causes given, eye-strain, constipation, and auto-intoxication are probably the most common.

Eye-strain

Blurring of the print always indicates some form of visual defect and is, therefore, positive evidence of eye-strain. It is always well to ask if the pupil habitually sees double; also if he notices spots before the eyes, if the letters appear to move, etc.

Earache

Chronic earache always indicates more or less serious trouble. It means that inflammation is present

in the ear. In many cases earache is due to the presence of adenoids, and frequent earache always indicates either adenoids or some other abnormal condition of the throat. If not corrected, earache very frequently leads to more or less permanent deafness.

Discharging ears

This condition is more serious than earache, and indicates that the disease process in the ears is advancing rapidly. The condition should always be treated at the earliest possible time. Always test the hearing of pupils who have earache or ear discharge by means of the watch tick or whispered words. As a check in this test always test children with normal hearing at the same time. Test each ear separately.

Difficult nasal breathing

Children who complain of constant difficulty in breathing through the nose usually have adenoids. Sometimes the obstruction is in the nose itself and in this case is due to enlarged turbinates or to polypi. Many children with adenoids will say they can breathe easily through their noses simply because they have never breathed normally, and do not, therefore, know what nasal breathing means. Inquire if the child's mouth is usually dry when he wakes in the morning.

Frequent sore throat

This condition nearly always indicates diseased tonsils, and should always receive prompt attention.

If the tonsils are much enlarged, adenoids will nearly always be found present. On the other hand, adenoids are often found present when there is no enlargement of the tonsils. Rheumatism is often associated with diseased tonsils. So-called "growing-pains," stiff-neck, and tender, aching joints are common symptoms of rheumatism.

THE SIGNIFICANCE OF ANSWERS TO PART II

General appearance

There are many reasons for poor general appearance. The most common is probably general malnutrition, due commonly to insufficient food, the wrong variety of food, or the wrong use of food. Some other causes are the following: —

- Adenoids.
- Diseased tonsils.
- Bad ventilation.
- Very rapid growth.
- Tuberculosis.
- A recent sickness of some kind.
- Very defective teeth.

Peculiarities in posture, walk, etc.

These conditions may be explained in general by weak muscles, due to rapid growth; spinal disease (often tubercular); flat-foot or weakened arches; rickets; tuberculosis of knee-joint or hip-joint; paralysis, from some serious disease, such as infantile paralysis, meningitis, or diphtheria.

Mental conditions

A child who is two years or more retarded in school, who does not play normally, or who is not mentally alert, should always be suspected of being mentally deficient. He should be tested by the Binet method.¹ It is necessary to distinguish between merely dull and mentally deficient children. Many mentally deficient children show none of the physical signs of such a condition, and may be the best-looking children in the class. Be careful not to overestimate the intelligence of the old, mature child who is two or three years retarded, even though he does fairly good work in a class of much younger, less mature children. He must be judged by the ability of children of his own age, and not by children younger than himself.

Nervous conditions

Stammering is nearly always a nervous condition, and is not usually due to physical defects. Nail-biting is almost never a mere habit, but is caused by an unstable condition of the nervous system. Spasmodic movements should always be carefully observed, as they often indicate St. Vitus' dance or habit-spasms. True hysteria is very seldom observed in school children. General nervousness is indicated by a lack of repose, too much emotion, inability to keep quiet, etc., and may be due to any of a large number of causes. Sometimes the home conditions will offer the

¹ See p. 105.

explanation. Often the child is from a nervous family. Sometimes the trouble is due to bad sexual habits, but more often the sexual habits are due to an unstable nervous system. So-called "bladder trouble" is practically always a sign of general nervousness, and usually has nothing at all to do with the condition of the kidneys.

Nose and throat

Adenoids are usually indicated by a nasal voice, frequent colds, crooked and prominent teeth, mouth-breathing, and mental dullness. Not all of these conditions are always present, but some of them are. Adenoids and enlarged tonsils are usually associated.

Ears

Never forget the relation between adenoids and earache, discharging ears, and deafness.

Eyes

Children with crossed eyes nearly always have a defect of vision, and the crossed eye will in time usually become blind, or nearly so. These children should have properly fitted glasses at the earliest possible moment. This will often straighten the eyes and save the sight. Defective eyes are often indicated by red lids or red eyes, blurred vision, double vision, etc. The teacher should test the sight of each child by using the Snellen Test Type.¹

¹ The Snellen cards, together with directions for their use, can be secured from any book-dealer for a few cents. A set should be kept in every schoolroom. See chapter vi, p. 95.

Skin

Any sudden eruption should always be noted as possibly indicating a contagious disease, such as measles, chickenpox, scarlet fever, and the like. No sort of skin disease should ever be ignored; its cause must be discovered.

Examine the teeth of the children yourself

Stand in a good light, have the children file past you and open their mouths as widely as possible. Take a quick look at all of the teeth and make a note of each child who has defective teeth. It is not necessary to note the number of such teeth, for every defective tooth ought to receive immediate attention.

Some general observations

Try to discover what children always have coated tongues. This is most always due to constipation. Try to correct this condition among children, as it is extremely common and usually receives very little attention at home.

Attempt to learn the home habits of the children under your care. You will be surprised to learn how many keep very late hours. Try to learn the cause for this. Try to learn how many children eat candy every day. Talk to them about bathing habits, and learn what their habits actually are in this respect. Make a list of the children who live in families where there

is chronic sickness, and discover what the sickness is. Always be on the alert for signs of children's contagious diseases when they first manifest themselves. Use the information obtained by the Outline for practical teaching in matters of hygiene, in your particular room. This will furnish a more effective basis for useful health teaching than anything else.

PART III: SOME RESULTS SECURED BY THE OUTLINE FOR THE HEALTH GRADING OF SCHOOL CHILDREN

In order to test the usefulness of the method for health grading of school children, and also to demonstrate to teachers actual conditions in their rooms, thirty-three grades were questioned on Part I of the Outline.

In obtaining the answers, the physician asked the questions, one at a time, of the entire roomful of children, their answers being indicated by rising.¹ At this time no individual names were recorded. The tabulated results which appear below are remarkable not only as indicating the number of physical handicaps which may easily be discovered, but also in respect to the uniformity found in different schools of the same and widely separated towns and cities. No one can possibly read these results, so easily obtained, and remain unconvinced of the seriousness of the de-

¹ To avoid suggestion it is better to secure the data by questioning each pupil privately whenever time permits. If this is impossible, the pupils should be urged to state the exact facts, without paying any attention to the answers given by other children.

fects from which at least 40 to 50 per cent of school children suffer.

The accompanying table summarizes the answers to "survey" questions in ten cities and towns of Min-

TABLE I

ANSWERS TO "SURVEY" QUESTIONS ADDRESSED TO 3215
MINNESOTA CHILDREN

Name of Town or City	Biwabik	Austin	Two Harbors	Northfield	Coleraine	Hibbing	Chisholm	St. Peters	Cloquet	Farmington	Per Cent
Total Pupils	187	582	299	247	210	272	425	278	590	125	
Coffee	159	353	238	159	151	221	364	175	526	87	75+
Tea	65	121	90	80	83	51	213	X	78	52	29+
No. Ventilation in bed-room	104	222	180	124	122	174	207	50	221	54	45
Headache	43	139	61	81	29	50	86	80	116	41	22
Poor Vision	33	97	37	57	27	25	42	52	53	18	13
Earache	12	80	35	32	18	26	31	28	34	9	10—
Running Ear	5	27	10	11	5	9	12	4	7	1	3—
Poor Hearing	10	43	21	10	10	7	16	9	4	6	4
Nasal Obstruction	8	68	29	19	31	14	32	X	14	11	6+
Toothache	43	258	57	75	73	73	151	55	129	27	30—
Double Vision	8	20	5	11	X	5	13	11	3	X	2.5
Common Tooth Brush	25	X	45	11	X	7	84	X	33	12	9+
Bad Teeth	X	298	137	131	60	195	233	94	370	59	50

nesota, in which 3215 children are included.¹ In a few cases certain questions were omitted. This is indicated in the table by crosses, X. It will be noted that the data, on the whole, are remarkably uniform.

Tabulation of the replies by grades showed that as children pass beyond the sixth grade nearly all the conditions improve. This includes earlier hours for retiring (because parents take young children out with them at night), far better ventilation in bedrooms, and a better condition of teeth due to the completion of second dentition.

Of 2500 grade children questioned, 75 per cent make a breakfast entirely, or almost entirely, of starchy foods. Only 15 per cent of the 2500 have fruit of any kind for breakfast. The following are the usual breakfasts of these children: —

1. Coffee, bread and butter.
2. Coffee and oatmeal.
3. Coffee and some other cereal.
4. Coffee and hot cakes.
5. Coffee alone.
6. Coffee and biscuits.
7. Coffee and coffee-cake.
8. Bread and butter alone.

Is it any wonder that nearly 23 per cent have frequent headaches?

¹ At a later date 6000 additional children were questioned with practically the same results.

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CHAPTER VI

A DEMONSTRATION CLINIC FOR INSTRUCTION IN THE OBSERVATION OF DEFECTS

FOR the purpose of instructing teachers and school nurses the "Demonstration Clinic" has proved of the greatest possible assistance. From fifty to one hundred and fifty pupils from various grades, preferably the third, fourth, and fifth, are assembled in the presence of all the teachers (and school nurses, if there are any). The physician in charge of the "clinic" then proceeds to demonstrate the health conditions of the pupils present. To indicate exactly how the demonstration clinic may be carried out, a verbatim report is given here of one held by Dr. Hoag, in a small Minnesota city, with eighty-five children from the third, fourth, fifth, and sixth grades present. A summary of sixteen other demonstration clinics, held in Minnesota cities and villages, is also given in a table at the end of the report.

VERBATIM REPORT OF A DEMONSTRATION CLINIC

Object of the clinic

The object of this demonstration is to show teachers how easy it is to detect the ordinary physical defects from which children suffer. Most people have the idea that it is necessary to have an expert go into the schools to find these handicaps, but any teacher, after a little instruction, can discover

the ordinary handicaps almost as well as any expert can. Only the larger places in the country have any health supervision of schools that is really worthy of the name, and the reason is that they think only experts can do the work. Now, as a matter of fact, all the schools everywhere need to have this sort of health work, and in many instances the only way they can obtain it at present is to have the teachers themselves attack the problem.

The ordinary handicaps that we find in children are about the same everywhere we go, whether it is in a California town or in a Minnesota town; and the proportion of the defects that we find is practically the same everywhere; so that I could say in advance in this place just about how many cases of adenoids will be found, how many cases of visual defects, how many of chronic earache, how many of headache, how many of defective teeth, etc.

We are not looking for sick children, as that word is ordinarily used, and we do not often observe sick children in the schools, but we do find a very considerable number who have physical or mental handicaps which interfere with their school progress, and it is these handicaps which we wish to discover and if possible have corrected. We do not realize, for instance, that a large number of children suffer from chronic headache who never say a word about it unless they are questioned. They take it as a matter of course and become accustomed to it. We do not realize that a very considerable proportion of children have more or less chronic earache, and yet never mention it unless the earache is so bad that they cannot sleep at night. We do not realize that a large number of children have toothache, some of them most of the time; that they have visual defects so severe in many cases that they do not read comfortably or well. They suffer from various handicaps of this sort and never say anything about it, simply because they are accustomed to the condition and very often know no other. They have no standard of comparison. Children in the main never complain about their physical handicaps unless they are so serious as actually to make them sick, and this is a point which we must always remember in dealing with them.

Purposes and methods of work

Now what I want to do here this afternoon is to ask these eighty-five children some very simple, commonplace questions, just as I would like to have you do with your children in the various grades, and the answers to these questions will indicate pretty accurately the sort of physical handicaps which are present. I shall have to ask the questions of the whole group and not take down any individual names, but teachers in gathering such information ought to record each child's examination separately and make it a permanent school record.

As a matter of fact, at least twenty-five per cent of school children have visual defects of some kind or another. These are ordinarily discovered by the use of the test-type card, but without any card or apparatus of any sort you can still discover a very considerable number of eye defects by a simple question. In order to demonstrate this point, I am going to ask these children the question and they will answer by rising, and the question is this — "Now, children, I want you to listen carefully, and do not answer until I am all through. How many of you notice when you read in your books that the print is hard to see, or that it often looks dim, or perhaps crooked, or that you see two letters instead of one, or two lines instead of one, or that in some way you find it hard to read?"

The number of children who are standing is eighteen, and we will now try to discover, by some further questions, whether these children really know what they are talking about or not. The children will give answers of a certain type, and these answers will be exactly such as children give in other places and in almost exactly the same words, for the simple reason that they have the same defects that children in other places have. I want to ask the teachers to please listen carefully to the responses which are made when we ask the children about their eyes.

Condition of the eyes

I am going to ask this boy how the print looks when he reads in his book. He replies that "it looks blurred." The

next boy says that the print "looks dark," but I am going to ask him what he means by "dark." He replies that he cannot see it, and I notice that he is troubled with what is technically called "squint eye," or crossed eye. Let us ask him if he ever sees letters or lines double. He says that a good deal of the time he does see letters and lines double, which is nearly always the case in instances of this sort. Cases like this ought always to receive the promptest kind of attention, because the vision in the crossed eye deteriorates rapidly, and in many cases, if glasses are not properly fitted before the child is eight or nine years of age (or even earlier), the vision has already gone to the extent of fifty to one hundred per cent.

I shall test this boy's vision right at this point, and see how much he still retains in the crossed eye. I have tested him by first standing away about twenty feet and holding up my fingers and having him tell me the number he sees. He fails absolutely at a distance of twenty feet; then he fails at a distance of fifteen feet and he continues to fail until I get within nine feet of him. At this distance and in a strong light he can tell how many fingers are held up in front of the crossed eye. This shows that his vision has very greatly deteriorated in this eye. If glasses had been properly fitted to this boy's eyes several years ago, most of the sight could have been saved. This illustrates very well how absolutely necessary it is to correct the vision in any child who has a tendency to crossed eye. If the glasses are put on early the eyes will, in the majority of cases, be straightened without any operation, and most of the vision, if not all of it, will be retained. I have just asked the boy how long he has been wearing glasses. He is eleven years old and he says, "only a little while." The trouble is that the glasses were procured too late.

I have just asked a little girl how the print looks to her, and her reply is that when she looks in her book she sees "two lines just the same." This is another case of "squint eye." I will also test her eyes in the same manner that I did the boy's. This child's vision is exactly the same as in the case of the boy. She reads fingers at a distance of about nine or ten feet.

The next child that I question about her eyes says that the print "looks blurred, and runs all together."

The next little girl replies when I question her about the print that "it blots," which is a perfectly characteristic

answer, given by a great many children in different places, and has a definite significance to anybody who understands the eye.

The child now before me says the print "looks light," and by that she means that it appears dim and is not sharp and clear-cut. She probably has a case of astigmatism.

Still another child replies that the print "looks crooked," which is also a very common reply.

The next child has just told me what I suppose one hundred children at least have said. She remarks that the print "looks upside down." By that she does n't mean that it is actually upside down, but that it is turned around a good deal.

This little girl now before me gives a very interesting and definite answer. She says, "The print looks like it was n't there and I am always skipping words." There is no question at all about the fact that she has a definite visual defect.

The boy I am now questioning says the lines "look double." He has what we call "muscular unbalance."

The next child says that after he has looked at the book a little while he sees "two lines instead of one."

Another child says that some of the letters look big and some look small."

This child whom I am now questioning gives another very interesting answer, which is definite and significant. He says that "some of the words look light, and some of the words look dark," which is just as clear a diagnosis of astigmatism as can be given by any doctor.

The little girl now being questioned says that the words "look blotted, and some look lighter than others," and "I often mispronounce words, because I am not sure what the words are."

The next child says, "When I study, the words all run together, and then it gets black."

Here is a boy who tells me that he always reads the same line twice and he does not know why he does it, and when he reads at home in "magazines and things," he gets a headache. This is a very clear diagnosis of eye-strain.

The next boy says "the words look dim and shaky." A great many children complain that the words move or jump.

I will not repeat all of the remainder of the responses which

the children will give, but will pass on in the examination hurriedly.

What I want you teachers to notice particularly is that, with two exceptions, all of the children of the eighteen questioned give prompt and definite replies as to how the print looks to them, and that their answers give evidence that there is some real defect present.¹ Two of the answers were very vague, and the children merely repeated what they heard other children say. You can always be sure that in such instances there is little or no trouble. If a child has a visual defect that amounts to very much it can ordinarily be brought out by the sort of response which he gives to the question about his eyesight.

Testing the vision

We will now make a short demonstration of how to test the vision by use of the Snellen Test Card.

In order to make this test, place the eye-test card in a good light, making sure that the child is not facing the light. Measure off a distance of 20 feet. Hang the card on the wall nearly on a level with the child's eyes. Cover one eye with a piece of cardboard or an envelope. Never allow anything to press on the eye, or it will interfere with the vision for several moments. Testing one eye at a time in this manner, ask the child to read the line on the card which is marked "20 feet"; that is, he ought to read the 20-foot line at a distance away of 20 feet. If he gets a majority of the letters, we pass him on the test. If he fails to get a majority of the letters, we ask him to take the next line, which he should read at 30 feet. If he fails to get the majority of the letters in this line, try him successively with each line above until you find a line which he can read. We will say, for example, that he reads the line which is marked "40 feet"; that is, it is a line which he ought to read at a distance of 40 feet, but as a matter of fact, he is only standing 20 feet away. Therefore his vision is 20/40, or one half what it ought to be. The distance which the child is standing away from the card represents the numerator of the visual fraction, and the line which

¹ These children had been selected by the demonstrator because all of them presented objective signs of visual defect.

he reads on the card represents the denominator. Children have a tendency to transpose letters, but this is of no consequence and no attention should be paid to it. If they are very slow in reading the letters, it usually indicates some eye defect, even though they read them correctly.

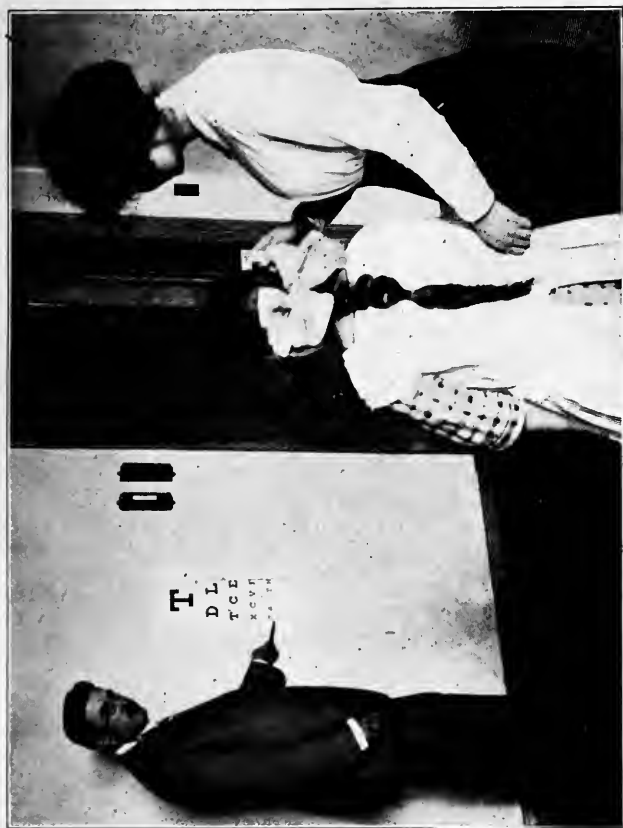
I will now test the eyes of the boy who said a few moments ago that he often sees the letters double. I find that he does not see all of the letters in the 20-foot line and complains that they look blurred. He reads the 30-foot line without any difficulty, which gives him a vision of about 20/30.

I am now testing another child who said that the letters run together. She reads the 30-foot line without any difficulty and a majority of the letters in the 20-foot line; apparently she only has a mild degree of eye defect.

The next child reads a majority of the letters in the 20-foot line, but fails on one or two and says that they look slanting. Here, again, is apparently a rather mild degree of eye defect.

This next little girl did not respond originally, but nevertheless she has trouble. She cannot read the last line. She fails to read both the 20-foot and 30-foot line with the right eye, and testing her eyes with each line successively, I discover that the 100-foot line is the first she can read. This little girl's vision is then about 20/100. The child says that the print looks all right to her when she is reading, but the teacher remarks that she always has to hold the book near her eyes. Of course she has a very high degree of eye defect, probably myopia, shortsight, and she ought to have glasses at the earliest possible moment, before the eyes deteriorate any more than they have already.

In testing the vision of the young child who has not yet learned to read, it is best to make use of the McCallie test. It consists of a series of cards about 5 inches square on which are the pictures of a boy, a girl, and a bear. They are playing the game of ball, and the ball, which is represented by a small black dot, should be seen by the normal eye at a distance of 20 feet. By changing the cards frequently it is easy to discover whether or not the child can really determine who has the ball. If he does not see the dot at a distance of 20 feet, then you gradually walk toward him until he succeeds in seeing it and then you estimate from this about what his visual error is.



TESTING VISION



Other eye defects

Teachers ought not only to observe and record defects of vision, but ought also to make note of congested eyes, watery eyes, sties, and granulated lids. None of these conditions are normal, and all of them should receive attention. The serious eye disease known as "trachoma" is contagious, and very difficult to cure. It is observed chiefly among children from the slums who have recently arrived from Europe. It is also rather common among the Indians and Japanese. It is difficult for any but an expert to recognize this disease, but one should suspect it when any children of the class indicated above have eye conditions described as follows:—

(1) Inflammation: this is not very intense, but there is considerable swelling of the lids, an aversion to light and a flowing of tears.

(2) The outer surface of the eyeball becomes roughened.

(3) The inner surface of the eyelids is covered with small granules not unlike boiled sago grains in appearance, and this produces what is called granular eyelids.

A sudden redness of the eyes, with more or less sensitiveness to light, particularly when accompanied by what appears to be a cold, should always cause the suspicion of measles. Sometimes pink-eye starts in this manner.

Adenoids

I want to show you now how easy it is to detect the children who are suffering from adenoids. I can go through any room and in most instances can detect nearly all the adenoid children within two or three minutes after I have been in the room, and what I can do the teacher ought to be able to do just as easily, because she is perfectly familiar with the children. I shall select a boy whom I have never seen before, a boy who looks to me as if he had adenoids. Then we will test him to see if he really has them. My first reason for selecting this boy is because he has a tendency to breathe with his mouth open. In making the examination I note at once that the lower teeth cut considerably inside the upper teeth and that the upper teeth are prominent, which is very often the case where a child has breathed through his mouth for

one year or more. In other words, mouth-breathing has a tendency to deform the jaws, so that the teeth in the upper jaw are either crooked or prominent, or both. Or, to put it another way, probably in ninety-five per cent of all the cases where one notes crooked and prominent teeth, mouth-breathing has occurred. Adenoids tend to produce more or less deformity of the bones of the face. Thumb-sucking and the early loss of the first teeth also have a tendency to produce crooked teeth and other deformities of the jaws.

The first thing that I am going to do in testing this child is to ask him to talk a little, because I want to discover the quality of his voice. The boy's voice proves to be distinctly nasal in quality, and by giving these words which you have just heard him pronounce, "nine," "ninety-nine," "nine hundred and ninety-nine," you at once bring out this nasal quality of the voice. Now there are in general only two reasons why a child has a nasal voice. One is that he has an acute cold, and the other is that he has an obstruction in his nose, usually due to adenoids. This boy has no cold; so reasoning from what I have said, he has adenoids. And you can be sure in practically every case that, barring a cold, a nasal voice in a school child means just one thing, and that is adenoids. If in addition to this you can discover that the child sleeps with his mouth open and has a tendency to snore, you may be quite sure that you have a case of adenoids. I have just asked this boy if he snores in his sleep and he says, "Yes." His mother tells him that he does.

In reply to my question as to how his mouth feels when he wakes up in the morning he says that his "mouth feels dry," and the reason, of course, is that he has breathed all night with his mouth wide open. Mouth-breathing is never normal.

The next boy I have selected for examination says that he has had an operation on his nose and throat, and as a matter of fact I note that the tonsils have been removed. Probably the adenoids were also removed, but in any event there is some adenoid tissue still present. The adenoid tissue may not have been completely removed or it may have returned, because not infrequently adenoids come back a second, and sometimes even a third time. There is only one thing to do in these cases, and that is to have the operation repeated and



Why adenoid children cannot breathe.



Three views of an adenoid face.

ADENOIDS



CROSSED EYE AND OBSTRUCTED BREATHING

Courtesy Dr. N. H. Bullock, San José, Cal.

all the tissue removed. This child's facial bones have been somewhat deformed by mouth-breathing before his operation.

Hearing, and ear troubles

Teachers ought always to be suspicious of ear trouble where there are adenoids, because adenoid tissue has a tendency to cause trouble with the ears. For this reason I am going to test this boy's hearing, to see whether or not it is good. I suspect that he is somewhat deaf, because he has already asked me to repeat questions a number of times. To test the hearing, one of the best ways is to use the watch. You want to determine how far you can hear your own watch in a certain room. You cannot state in advance how far a watch ought to be heard. Sometimes people say to me, "How far should a watch be heard?" Of course, it goes without saying that it depends upon the watch, and upon the room in which you are giving the test. To determine this point, take your own watch in a given room and see how far you can hear it, making sure that your own hearing is good to begin with; then let this distance be used as the norm. I can hear my own watch in this room at arm's length, which is close to two and a half feet. In testing the hearing, always cover the child's eyes with one hand. This boy's hearing is reduced in his right ear a little more than one half. In making the test be sure that the child is not drawing on his imagination, and in order to determine this point occasionally hold the watch behind you and ask the child if he hears it. The hearing in the left ear proves to be about two thirds normal.

The boy says that he has never had scarlet fever, nor, as far as he knows, any serious sickness. This is pretty good evidence that the defective hearing is not due to any acute infectious disease, as is sometimes the case, and that the decrease in hearing is due entirely to adenoids. This is certainly an illustration of the fact that adenoids ought to be taken care of early. In a very large number of cases adenoids result in seriously defective hearing. Every child with adenoids ought to have his ears examined. Every child who has earache or running ears ought to be examined for adenoids. In other words, nearly all the ear trouble in children originates in the nose and throat. The trouble is not primarily in the ear, but in the nose and throat. Sometimes it is be-

cause the adenoid tissue which is situated behind the soft palate grows over the opening of the eustachian tube, which as you know leads to the middle ear and ventilates it. Sometimes the ear trouble results from a catarrh of the nose and throat, due either to adenoids or diseased tonsils, and the inflammation travels through the eustachian tube to the middle ear and sets up a similar inflammation here. So never forget that there is a very close and intimate relation between ear troubles and those of the nose and throat, and that most ear defects are avoidable.

The whisper test of hearing

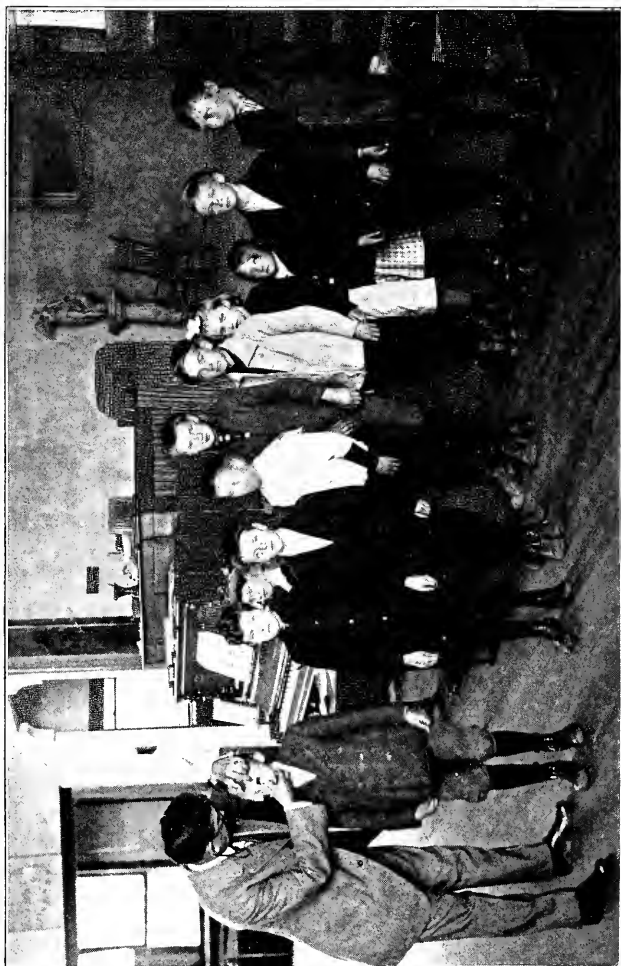
If you ever have any reason to suspect that the answers of a child are incorrect, when he is being tested with the watch-tick, it is a very easy matter to test him with the whispered voice. Place him at least twenty feet away, cover your own lips with a piece of paper, so that he cannot see their movement, and then give him commands in a whisper. If he fails to execute the commands you may be perfectly sure that he does not hear well, provided a normal child already tested at the same distance does execute the same commands when you use the same intensity of whisper. It is always a good procedure to use both the watch and the whispered voice test. In the main it is safe to say that eight per cent of the children in schools have adenoids, that five to seven per cent of the children are partially deaf when tested with rough methods, and that nearly fifteen per cent of them would be found to have defective hearing if they were accurately tested by a physician. I want to repeat here that almost all of this trouble is due to neglected adenoids or diseased tonsils.

The teeth

In examining the teeth of children, stand in a good light with your back toward the window, and have the children form a line. Let them march past you, and as each child comes in front of you have him open his mouth just as wide as possible. Put one hand on the top of the head and the other on the chin, and the mouth will open wide. Note whether or not the child has any bad teeth, and if he has, make a record of it. It is a general impression among par-



TESTING HEARING



TEETH EXAMINATION

ents and teachers that it is all right to ignore defective teeth in young children,— i.e., the baby teeth, — but as a matter of fact it is more important to get the first, or deciduous, teeth repaired than it is the permanent ones. So any decayed teeth, whether in a young child or in an older one, ought to receive prompt attention.

General health survey

Having demonstrated these simple procedures in testing the eyes, ears, nose, and teeth, we will now make a general health survey of the children, by asking some questions.

“How many children here have a good deal of headache? By that I mean as often as once a week, or three times a week, or every day?” Eight children respond to this question and complain of more or less chronic headache. This is a smaller number than we usually discover. There are eighty-five children present, and out of that number we should expect to find fifteen or twenty who suffer more or less from chronic headache.

“How many children here have earache every once in a while?” Now the number standing is just about what we should expect to find. We have ten children standing, which is about the usual proportion.

“How many of you children sometimes have running ears? Do you ever come to school with pieces of cotton in your ears?” In this group there are no children who complain of running ears. Ordinarily we find about four per cent.

“How many children often have toothache?” Seventeen children complain of more or less toothache. It is well to remember that a sound tooth never aches, although it is also true that some decayed teeth do not ache. So you can be sure that every child who has aching teeth has unsound teeth, but you cannot be sure that every child who does not complain of aching teeth has sound teeth.

“How many children here have a toothbrush at home?” Thirty-six of the eighty-five present reply that they have.

“How many use your toothbrush every day?” Only seven reply that they do. Unless a child uses his toothbrush regularly you may be perfectly sure that he does n’t use it much, if any. It is one thing to have a toothbrush, but quite another thing to use it, and particularly to use it correctly.

"How many of you have a toothbrush that is all your own, that nobody else uses?" The answer indicates that there are about three "common" toothbrushes. This is a smaller proportion than we usually find. We generally discover about five to ten in every hundred children who use the "family" toothbrush.

"How many children always have the bedroom window open at night, even in cold weather?" Sixty-five of the eighty-five present do not have ventilated bedrooms when the weather is cold.

How many children have ever been to a dentist?" Only twenty-eight out of eighty-five have been to a dentist at some time. The rest apparently have never been at all.

"How many of you children drink coffee?" Sixty-eight reply that they do. The proportion is usually about seventy-five per cent.

"How many of you always eat some fruit for breakfast?" Eighteen out of eighty-five respond that they do. The remainder apparently do not, and yet fruit in some form is a most important article of diet for the child.

"How many children here always have some meat or some eggs to eat for breakfast?" About four fifths of the children are standing. Usually we discover that over half of the children eat starchy breakfasts of a most inadequate nature.

Physiological and chronological age

At this point I would like to call your attention to the fact that we have in the schools a very considerable number of pupils in whom there is a great discrepancy between the physiological and chronological age. Under-developed children are often immature in mental as well as physical make-up, and for this reason they are prone to exhaustion and early neurasthenia when subjected to the same school strains which stronger and more mature children of the same actual age can easily withstand. Teachers and parents should give careful attention to the physiologically immature child, for they may in many instances save such from serious consequences in later life.

Please observe the group of pupils now standing before you. There are five children, all eleven years of age, but physio-

logically there are apparently great differences present. Between the largest and the smallest child here there is a difference of over forty pounds in weight and eight inches in height, to say nothing of differences in muscular strength, lung capacity, general endurance, etc. These children are all expected to do exactly the same school work, but it is evident from the most superficial examination that some of them are relatively weak and immature. The smallest child in this group has to my personal knowledge a definite neurosis at this very moment.

Summary of the observations

Now, to make a rapid summary of what we have discovered here, by a few very simple questions: We note that of 85 pupils, 16 apparently have definite defects of vision; 5 have chronic earache; none complain of running ears; 8 have chronic headache; 17 have frequent toothache; 57 have never been to a dentist; only 38 have toothbrushes of their own, and of these but 7 use them every day; there are 3 "common," or "family" toothbrushes; 65 have unventilated bedrooms in cold weather; 67 have no fruit for breakfast; about one fifth have no proteid food for breakfast; and 68 drink coffee.

In addition to the points which have been brought out in this demonstration clinic to-day it is easy for the teacher to make observations in respect to the following conditions: —

- Frequent sore throat.
- Malnutrition.
- Nervous disorders.
- Deformities.
- Defective postures.
- Glandular enlargements in the neck.
- Goitre.
- Skin diseases.
- Early contagious disorders.

Hygiene teaching

[At this point the children were dismissed and the rest of the talk was addressed to the teachers.]

This little questionnaire not only brings out the existence of a very considerable number of physical handicaps, but ought to aid you very materially in discovering what sort of hygiene teaching is most needed with a given room of pupils, and I would recommend it to you particularly for this purpose. It is of no particular use to teach children about things which are not related to their daily lives, but by such a series of questions you can find out almost exactly what things they most need to know in respect to their personal health. If a child suffers from earache, or if several children suffer from earache, the rest of the group in the room will be interested and some teaching on the subject of earache will be effective. The same may be said of toothache, visual defects, and the other things which we have mentioned.

Notifying parents

A word now about how to get a response from the parent, after the teacher has discovered that physical defects are present. A blank notice ought to be used, such as is found in the little survey which the Minnesota State Board of Health furnishes free to teachers. The notice reads as follows: "..... appears to the teacher to be in need of attention. A further examination by your family physician, dentist, or specialist, is advised." Now, you see that the notice simply says "appears to," and consequently does not definitely commit the teacher. This notice is signed by the Principal of the school, or by the Superintendent. The teacher simply writes in whatever she thinks is wrong with the pupil. In the majority of instances you will find that the notice receives no attention whatever on the part of the parent, and this is one great difficulty that teachers complain about in respect to this health work that they are asked to carry on. Parents seem to be quite indifferent to the physical handicaps of their children. However, this is only an apparent indifference. The real difficulty is that the parent does not understand the significance of the conditions found in the child. A parent does not appreciate that adenoids have serious consequences. He does not know that there is any relation between aching and discharging ears and adenoids, or between adenoids and crooked, prominent teeth and reced-

ing chin, or between adenoids and catarrh, or between enlarged, diseased tonsils and rheumatism, or between visual defects and headache and nervousness, and so on indefinitely. Now what the parent really needs is some simple information along these lines. When once he really understands the situation, in almost every case he will coöperate. I have found this to be the case by long experience in work with school children. In order to give the parent the kind of instruction which he requires, I think the best plan is to send with the notice which the child takes home a little pamphlet which describes in very simple language what the defect is, and what the consequences of such a defect are when neglected.

Mentally peculiar and defective children

Exceptional children of various types have been in our schools since schools began, but only within the past few years has any systematic attempt been made to recognize and classify them. Indeed, such recognition and classification was almost impossible until psychologists developed practical, direct methods for the use of schools. Teachers have always been able to point out some "fools" in their classes, and other types of exceptional children have been vaguely recognized, but "fools" have been present who were thought to be merely slow or dull; "misfits" who were supposed to be "fools"; dullards who were considered "misfits"; and so on indefinitely. It remained for the psychologists to devise methods whereby these various types might be studied and classified, and among these must be particularly mentioned Witmer and Goddard of this country, and Binet in France.

In 1905 Binet and Simon, of Paris, first published their tests, now popularly known as the "Binet Scale," and in 1908 and 1911 they still further developed and improved this method. These tests have from time to time been modified, enlarged, and improved by various other psychologists, including among others Goddard of Vineland, Kuhlmann of Faribault, and Terman of Stanford.

The Binet method still leaves much to be desired, but is nevertheless serving to stimulate teachers as they have never been stimulated before to make careful observations of the

unusual types of children under their care. According to recent investigations, and especially those of Goddard, from 1 to 3 per cent of the children in our public schools are mentally defective, and this in spite of the fact that they are frequently unrecognized as such by either their parents or teachers. Such children often present no physical signs of such defectiveness and may indeed be among the best-looking children in a grade. Sooner or later, however, children of this type become retarded, and attention is thus called to them. A safe rule for teachers to follow is that every child who is retarded in school two or more years without evident reason should be suspected of possessing some degree of mental defectiveness. Not every child who is thus retarded is feeble-minded, but proof to the contrary should at least be established before the child is removed from suspicion. Degrees of feeble-mindedness are present among school children, varying all the way from low grade imbecility to the condition of the high-grade feeble-minded person known as the "moron," who is just below the line of normality.

For example, I recently examined a girl of fourteen who had been in the first grade for five successive years, and it soon became apparent that she had a mentality of about three years. Beyond this degree of intelligence there is no reason to believe she will ever pass. Another child had a chronological or actual age of fourteen and a mental age of eight and one half. This boy may perhaps develop to a mental age of a normal child of nine or ten years, but not much beyond this. Still another pupil had an actual age of sixteen with a mental age of only nine. Another was twelve years old with a mental age of seven. In every one of these cases the teacher knew, of course, that something was wrong, for all were retarded in school, but that it was true feeble-mindedness was never suspected except in the first instance, and even here it was not understood by parent or teacher that the child was practically non-educable. On the other hand, a boy of fourteen was considered feeble-minded by his teacher when he was only a misfit.

Every village and city school system which I have visited has produced cases of retarded, feeble-minded children, and where there was time to make any sort of adequate study of



CHRONOLOGICAL AND PHYSIOLOGICAL AGE

These five children are all eleven years old.

the question the proportion has appeared to be just about that estimated by Goddard, viz., 2 per cent.

The following types of exceptional children require careful attention on the part of teachers: (1) Retarded children (especially those retarded two or more years); (2) slow children (not necessarily retarded); (3) precocious children (especially those who are delicate); (4) delinquent children; (5) misfit children; (6) highly nervous children.

In order to decide whether a child is actually deficient in mentality, some competent teacher in every school system should familiarize herself with the Binet method for measuring the intelligence of children. Such a teacher need not be expected to become an expert or to obtain very exact results, but she may at least in the majority of cases arrive at a conclusion which will establish the fact of feeble-mindedness or normality. The exact degree of feeble-mindedness present in a child is a matter for a clinical psychologist or school medical officer to determine, but this, though desirable is not always indispensable knowledge in the practical classification of school children.

[Eight retarded children were now called into the room and arranged in a line, with a ninth standing in front of them. It was recommended that in each case the actual mental age ought to be determined by the Binet scale. These children gave their ages and grades as follows: —

1	13 years	5th grade
2	12 "	4th "
3	13 "	4th "
4	13 "	5th "
5	13 "	5th "
6	13 "	5th "
7	12 "	4th "
8	14 "	5th "
9	9 "	2d "

A subsequent examination proved that only two of these children had a mental age equal to their actual age.]

Children who are merely dull will not and cannot receive a great deal of education, but their judgment is usually not bad. We should not try to educate these pupils too much. They will succeed fairly well in the world along lines not

requiring superior intelligence. The mentally defective child, on the other hand, has defective judgment as well as defective intelligence. He does not profit by the ordinary kind of school education at all. Either the school must provide special lines of work for him, or else he must be sent to an institution for defectives. Children nine years of age or less who are mentally retarded as much as two years, and children from nine to thirteen who are retarded as much as three years, do not ordinarily belong in the public schools. They should be kept in state institutions for the feeble-minded. Few who are retarded this amount can be made self-supporting.

A word of caution is required. Do not depend upon the Binet or any other method exclusively. Use common sense. Do not disregard ordinary school methods of judgment. Do not regard the Binet Scale as one which can be used with the absolute certainty of a measuring stick. Make use of any and all methods available in the estimation of the intelligence of exceptional children. Finally, regard your conclusions in most instances as tentative, and carefully watch the development of each case.

The other types of children mentioned, viz., the dull, precocious, nervous, and misfit, require as careful study as the feeble-minded. Indeed, they deserve perhaps more attention, because these are the types which under proper discipline make satisfactory progress and may be saved years of unnecessary sorrow and ineffective effort.

Professor Terman's handbook for the study of exceptional children, containing the most accurate revision of the Binet Scale which has yet been made, will be issued about January, 1915. It will give special attention to the simplification of the directions for applying the Binet method so that it may be used by any teacher.

Granite Falls	Pipestone	Albert Lea	Waseca	Windom	Wabasha	
April 18	—	—	—	—	—	Average per cent
3, 4, 5	4, 5, 6	3, 4, 5	—	3, 4, 5	3, 4, 5	
95	114	85	—	94	52	
39	3	65	—	31	31	37
84	102	36	—	94	38	81
19	22	7	—	37	18	19
2	8	3	—	12	3	9
x	48	57	—	x	26	50
28	30	17	—	x	14	28
26	28	8	—	25	13	25
16	37	16	—	17	12	22
13	19	5	—	7	14	13
4	7	0	—	4	3	4
x	36	x	—	x	x	15
6	x	7	—	x	x	6
x	x	5	—	x	x	5
x	32	17	—	46	20	33
84	95	67	—	91	41	82
54	82	68	—	x	40	71

ted on the basis of the number of pupils questioned in each case.

TABLE II. SCHOOL CLINIC

A SUMMARY OF CLINICS HELD AT SIXTEEN CITIES

PLACES	Adrian	Luverne	Dawson	Winthrop	Madison	Benson	Willmar	Morris	Montevideo	Redwood Falls	Granite Falls	Pipestone	Albert Lea	Waseca	Windom	Wabasha	
Date	May 7	May 7	April 23	April 20	April 24	April 11	—	April 8	April 16	April 22	April 18	—	—	—	—	—	
Grades	3-8 inc.	3, 4, 5	3, 4, 5	2-5 inc.	2-5 inc.	4, 5 & 7	3-5 inc.	4 & 5	3 & 4	4 & 5	3, 4, 5	4, 5, 6	3, 4, 5	—	3, 4, 5	3, 4, 5	Average
Number present	95	44	107	87	119	113	91	22	65	89	95	114	85	—	94	52	per cent
No ventilation of bedroom	20	26	x	57	x	40	35	8	x	5	39	3	65	—	31	31	37
Own a toothbrush	85	39	70	82	65	104	76	21	57	80	84	102	36	—	94	38	81
Daily use of toothbrush	14	10	7	14	14	8	11	1	22	40	19	22	7	—	37	18	19
Use of common toothbrush	x	4	13	10	x	15	x	x	x	x	2	8	3	—	12	3	9
Never have been to a dentist	x	19	58	x	x	x	x	6	x	x	x	48	57	—	x	26	50
Frequent toothache	20	9	28	41	30	37	32	14	17	20	28	30	17	—	x	14	28
Frequent headache	11	13	43	37	25	x	9	5	13	x	26	28	8	—	25	13	25
Blurred vision	6	16	35	19	x	25	20	11	7	20	16	37	16	—	17	12	22
Frequent earache	8	6	21	13	17	11	8	2	16	12	13	19	5	—	7	14	13
Running ears	3	1	4	4	9	2	1	1	3	4	4	7	0	—	4	3	4
Frequent sore throat	9	x	x	5	x	x	x	x	6	x	x	36	x	—	x	x	15
Adenoids	5	6	4	6	9	7	4	2	3	4	6	x	7	—	x	x	6
Diseased tonsils	x	3	x	x	3	x	x	x	4	x	x	x	5	—	x	x	5
No form of proteid food for breakfast	30	19	x	x	x	x	x	x	16	x	x	32	17	—	46	20	33
No fruit for breakfast	51	40	x	x	x	104	x	x	50	x	84	95	67	—	91	41	82
Daily use of coffee	58	25	83	96	98	x	71	15	33	40	54	82	68	—	x	40	71

x Blank spaces indicate that the question was not asked, or examination was not made. The percentages in the last column are, of course, estimated on the basis of the number of pupils questioned in each case.

CHAPTER VII

THE SCHOOL MEDICAL CLINIC

Difficulty of getting results from medical inspection

DR. H. H. HOGARTH, assistant medical officer of Education for the London County Council, has made an observation in his excellent book on the Medical Inspection of Schools to the truth of which all experienced school doctors will assent. "Every school doctor," he says, "goes through the same process of reflection and education. At first he enters the school as a novice, recognizing that his duty is to inspect, not to treat; that his own position is open to attack on the part of his brother practitioners; that he may be interfering with the rightful responsibilities of parents. He is so absorbed in the new work, the new ideas; so interested in the children, the educational system, and the teachers, that as soon as he has notified parent and teacher that a child is suffering from some particular disease, leaving them to take whatever further action may be necessary, he considers he has done his part. It is not until he returns a year later that he realizes how completely his advice has been ignored. *Then he begins to think.*"

As has already been emphasized, medical inspection in the beginning was little more than inspection. The early New York inspectors found that ninety-four per

cent of their notifications failed to bring results. In England, likewise, where poverty is more widespread than with us, the results were so disappointing as to awaken everybody concerned to a realization of the futility of any system of inspection which takes no steps to ameliorate the evils it discovers.

Casting about for means to accomplish this end, school authorities have discovered a number of remedies of various degrees of effectiveness. One of these is the system of school nurses, already discussed. Another remedy, supplementary to school nursing, and of even greater portent for preventive medicine, is the school clinic.

What the school clinic is

The school clinic is a clinic controlled by the educational authorities, and supported at public expense for the purpose of permitting a more thorough examination, and in some cases also treatment, of defects revealed by the routine inspection. In many cities the work of the clinic is confined to the first of these functions. The school doctor on his rounds finds children whose condition merits a more thorough diagnosis than can be given in the preliminary and rather superficial survey. The parents of such children are asked to bring them to the clinic for special examination and advice. If grave defectiveness or disease is found, the parents are urged to secure the necessary treatment from the family physician, or in case of extreme poverty the school doctor may arrange with local hospitals

or dispensaries for gratuitous service. Clinics for this diagnostic and advisory purpose have everywhere rapidly followed the introduction of medical inspection. In cities above 15,000 or 20,000 population they are fast coming to be looked upon as a standard requirement of any system of school medical service.

The main purpose of this chapter, however, is to describe a somewhat different type of school clinic, already becoming numerous in England and not unknown in the United States, — a clinic designed to afford more or less treatment as well as diagnosis.

Typical school medical clinics of England

Dr. Lewis Williams' account ¹ of the school clinic at Bradford, England, gives an excellent idea of the significance of this new medico-educational institution. Bradford is a manufacturing city of about 300,000 population. The school clinic was opened about two years ago, in the hope that it would make possible the treatment and cure of that large percentage of children who, because of indigence or parental neglect, had received no benefit from the inspection of their defects. The staff consists of three physicians, one dentist, two nurses, and two clerks, all on full time. Treatment is free, except that parents, when able, are required to pay the actual cost of eye-glasses. Although attendance is voluntary, objection to treatment is very seldom met with. The reason for this lies partly in the absence of expense, but perhaps still more in the psy-

¹ See reference 5, at the end of this chapter.

chological difference between persuading parents to do something and merely securing their consent to have it done. The former violates the principle of human inertia; the latter takes advantage of it. The following table shows what the Bradford clinic accomplished in 1910: —

	<i>Number treated</i>
Defective vision.....	650
External eye disease.....	576
Ringworm { of head	623
of body.....	122
Verminous heads.....	360
Scabies and impetigo.....	419
Ear discharge.....	285
Defective teeth.....	450
Stammering.....	150
Infectious disease.....	1052

Of the 5000 who secured free treatment at the clinic, certainly very few would have received any other attention whatever. Ringworm of the head was treated by the X-ray method, one exposure being sufficient in over 92 per cent of the cases. At a cost of from 30 to 65 cents each, 559 pairs of glasses were supplied. A special teacher was employed to give breathing exercises and other treatment to stammering children.

In 1908, a clinic was opened in the Poplar School, London, organized by Miss Margaret MacMillan and endowed by Mr. Joseph Fels. This is interesting as showing what can be accomplished by a small clinic, drawing its cases from only about 1000 children of a single school.¹ During the two years from December

¹ See article by Dr. Tribe, in *School Hygiene* for May 1911.

1908 to December, 1910, 450 pupils came under treatment in this clinic, or nearly half the total enrollment of the school. An analysis of 210 of the 450 cases shows a number of interesting facts. Twenty-three cases were treated daily for ear discharge, until cured. On the average, the number of months required to cure a discharging ear about equaled the number of months the ear had been neglected. The clinic recommended 35 cases of adenoids or enlarged tonsils for operation, and out of this number met only two refusals. Fifty-five children were treated for anæmia or debility, of whom 32 were either cured or distinctly improved. Of the 210 cases analyzed, cure was effected for 94, 21 were improved, 67 were still under treatment when the report was made, 8 had been transferred to a hospital, and 9 had left school. All of this was accomplished with no interference in attendance, and at slight expense.

Similar school clinics have been established in England in many other cities.

Cost, equipment and management

Hogarth estimates that \$7500 will usually suffice to build and equip a clinic for a city of 20,000 population, counting \$2500 for equipment and \$5000 for building. It should provide five or six rooms, as follows: One large and one small waiting-room, two consulting-rooms (for physician and dentist), a dark room, and a nurse's room. For a large staff more room will be required. The staff should include an oculist, a general

physician, a dentist, nurses, and assistants. In small cities the staff is usually composed of regular practicing physicians, who receive official appointments to devote from one to three half-days per week to the work. The customary remuneration is about \$5 for each half-day of work. Some of the larger clinics, like that of Bradford, employ all the physicians on full time. Dr. Williams thinks full-time employment preferable, wherever it is feasible. The physicians become more interested in their work, and come to see more clearly its educational bearings. Another practical advantage of this plan is that it is less likely to create friction between the school physician and local practitioners. When the school physician also engages in practice he is likely to be suspected of using his office to secure patronage for himself.

Why free clinics are necessary

The policy of free medical and dental clinics supported by public taxation differs in no respect from the universally accepted principle of public education. The latter, in effect, presupposes the former, inasmuch as children with neglected physical defects cannot receive in full the benefits which the school has to offer. It would be folly to permit any *a priori* social theory to blind us to the essential facts.

At the risk of repetition let us review some of the obstacles encountered in the process of education and of medical inspection which have led to such an unforeseen and radical departure from our ancient moorings.

The most important and common defects and diseases revealed by medical inspection are defective vision, discharging ears, adenoids and hypertrophied tonsils, tuberculosis, enlarged glands, carious teeth, and malnutrition. The purpose of medical inspection being to combat racial degeneracy and to conserve vitality, its sole justification lies in the contribution it makes to this end. This may sound trite, but it is fundamental. The following are illustrations of the difficulties met in the accomplishment of this purpose.

Discharging ears, as has been shown, present a condition of great seriousness, and need in most cases to have daily attention, such as syringing, washing, etc. Now experience proves that usually parents will not, even when urgently and repeatedly advised by the school doctor or nurse, secure for the child so afflicted the proper medical care. As a rule they lack the knowledge of hygiene and medicine which would enable them to appreciate the situation. Others, and these are very numerous, cannot afford the services of expert oculists or aurists at current rates, and are reluctant to accept as charity what they have not the means to command. Even when the aurist is consulted for a discharging ear, the tedious treatment which ensues, often lasting many months, is seldom carried out by parents with the needed regularity and carefulness. Physicians find that in most cases it is simply folly to expect a cure by this method. The only assurance of success in this direction is for the child to be taken daily to the physician's office or to the hospital for the necessary treat-

ment. Aside from the question of expense or the prejudice against charity, it is useless to expect that this will be done. Each visit may consume from two to four hours of time. Whether rich or poor we are too busy and impatient to submit to such a tedious ordeal. The result is that nine tenths of the cases of ear discharge among school children have been neglected. Theorize as we may about the danger of tampering with parental responsibility by the support of school clinics for free treatment, we are confronted by this fact of neglect.

With the inauguration of the school clinic the entire problem vanishes. The child goes daily to the near-by clinic, often in the building where he attends school, and receives the necessary treatment at the hands of nurse or doctor. There is no waste of time, no loss of school attendance, and a mere bagatelle of expense. Best of all, the treatment brings cure.

Most of the other forms of defectiveness offer, with greater or less variation, the same problems and the same solution. In the case of defective vision, for example, to secure parental action requires, in about 50 per cent of the cases, from two to four home visits by the school nurse. In the case of 15 to 30 per cent, nothing is ever accomplished. Many who respond do so by seeking the inexpert advice of opticians. Now and then a parent buys a pair of ten-cent goggles from a street peddler and thinks that in this sacrifice he has paid due homage to Hygeia. A small minority take their children to a reputable oculist and have them correctly fitted with glasses, at an expense of \$5 to \$30

each. Only a very small minority, be it said to the credit of humanity, seek for or permit assistance through laws for relief of the poor. The sum total of results is disappointing, notwithstanding the cost in time and energy. Upon the establishment of the school clinic of the English type the situation is completely changed. When a child is discovered with defective vision, instead of hounding the parents with arguments and pleadings, the child is sent to the clinic and is tested for glasses. The clinic even secures for the child necessary lenses and frames at special rates, arranged for by the school authorities with a reliable optician. The cost ranges from 30 to 60 cents, and is met by the parents, if they are able; if not, by the school board. In English cities, such as Bradford, about 80 per cent are paid for by the parents. But the important points are that the eyes actually receive treatment, that the treatment is skillful, and that the cost is inconsiderable.

In like manner, enlarged glands, tuberculous tendencies, throat occlusions, and many other defects require either more expert or more constant attention than they are likely to receive from the family doctor. The X-ray treatment for ringworm is a good illustration of the efficiency that may be secured by the introduction of wholesale methods into medical practice. Only a few practitioners have the equipment for treatment; those who have it charge high fees, while the disease is common only among the poor. Left to such a combination of circumstances the disease would flour-

ish indefinitely. The properly equipped school clinic practically eradicates it from a middle-sized city within a few months, and at an expense which is almost negligible.

By the old way everything had to be done with a maximum of inconvenience, resistance, and leakage. The chief obstacle always was human inertia, the most characteristic trait of mankind. If the success of any cause is contingent upon a general abandonment of the way of least resistance, that cause is already lost. An issue may have the passive favor of all the people and yet fail of fruitage through neglect. The old system tried to persuade the parents to do something; the school clinic only asks their assent. The school clinic attains the desired results and does it without friction.

The opposition to free school clinics

The opposition comes chiefly from practising physicians, some of whom look with apprehension upon every social movement which seems to point toward an ultimate socialization of their profession. The issue, however, becomes clear if we only remember that disease is to be conceived as an evil to be eradicated, not as a resource to be conserved for the benefit of any profession. Partly by his own fault, and partly for social and economic reasons, the family doctor has failed to keep the people well. The family doctor institution need not be abolished, but it must be supplemented. What it has not done at all, or what it has done only with huge waste of effort, presents a legiti-

mate field for organized social endeavors. There is no likelihood that any considerable portion of physicians will oppose the general introduction of the school clinic, though organizations like the League for Medical Freedom may be expected to do so most vigorously.

A committee of physicians commissioned by the local medical association to inquire into the bearing of the Bradford clinic upon private medical practice reported as follows: "Your committee consider that the school clinic as carried on at Bradford has not hitherto proved detrimental to the interests of practitioners of that district."¹ What the school clinic accomplishes is pure gain.

To protect the health of children is a social obligation

It is hardly necessary, interesting as it would be, to speculate upon the final outcome of the school clinic. Whether it will lead to the complete socialization of medicine and dentistry, just as education has been socialized, is a question it is impossible to answer. It is certain, however, that social regulation and control over matters pertaining to the health of children will be extended in the future rather than limited. Intrinsically there is nothing more radical in the principle of free medical and dental treatment than in the American scheme of public education and free textbooks. From the beginning the cry about weakening parental

¹ Quoted by Dr. Lewis Williams in his article on "School Clinics," in *School Hygiene* for March, 1911.

responsibility has been raised against both. Gradually we are learning that it is less a question of parental responsibility than of children's rights. Private enterprise has done too little for the health of our children to justify any claim to a monopoly of the business. It matters little what social procedure we adopt to insure that our children grow as nearly as may be into their full heritage of health and strength, as long as the end is accomplished. Least of all need we prematurely be frightened by the specter of socialism. To protect the bodies of children from defective development is not a question of socialism, but of humanity and of common sense.

The school clinic is effective from the mere fact that it is an integral part of the educational machinery. It works in the closest relations with teachers, attendance officers, and nurses. The presumption is all in favor of the child. His case will be watched from day to day. The more it comes under the observation of the school physician, the greater is the probability that needed modifications of the curriculum will be made. In the words of Dr. Lewis Williams, "inasmuch as those very diseases which chiefly affect school children and play such havoc with school efficiency and school attendance are the very ones most neglected by parents in spite of medical inspection, the school clinic plainly becomes the only method of dealing with the difficulty." As forcibly stated by Hogarth, "to secure an improved physical condition for the next generation, to obtain a higher standard both of school attendance

and of education, to give a fair chance to thousands who are now hopelessly handicapped before the race is well begun, are aims which cannot be lightly set aside."

Summary

We may summarize the benefits of the school clinic as follows: —

(1) It gives opportunity for a more thorough examination of serious or puzzling cases than is possible in the ordinary routine of medical inspection. This benefit is derived from all school clinics and has no necessary connection with any scheme of free treatment.

(2) It is the function of the school clinic to render the final decision in regard to segregations in open-air schools, special classes for the deaf and dumb, or schools for mentally defective children.

(3) The bacteriological department of the school clinic regulates authoritatively and conveniently exclusions for contagious disease, and readmissions upon recovery. A certificate of freedom from contagion issued by the practising physician is often worthless. The latter may have neither the bacteriological training nor the laboratory equipment to enable him to make scientific determinations of the presence or absence of pathogenic bacteria. Hogarth found that out of 240 certificates, issued by Bradford physicians, of freedom from scabies (itch), 234 were incorrect.

(4) The school clinic alone is in position to maintain the close relations with the school and with the individual pupils which will insure the constant attention

necessary to the successful treatment of chronic defects. This is especially true of discharging ears, malnutrition, tuberculosis, etc.

(5) In all lines of defectiveness the English type of school clinic brings results which it has not been possible to secure by any other means. Through its work, eye defects are corrected, discharging ears are cured, adenoids are removed, teeth are repaired, verminous conditions are eradicated. The logical issue of diagnosis is adequate and skillful treatment. This is what the school clinic insures.

(6) The introduction of systematic and wholesale methods in preventive medicine, and the consequent saving of time, energy, and equipment, puts the whole matter upon a different economic basis. Adenoid operations, eyeglasses, X-ray treatment of ringworm, and the like, are reduced to a small fraction of their former cost. Vaccinations by the school physician at the rate of twenty-five cents per child are just as effective as when performed by the practitioner for two dollars.¹

(7) The school clinic should not be conducted as a semi-charitable institution. The practice of restricting treatment to such cases as have been investigated and recommended by local charity organizations is indefensible. To make a certificate of indigency the badge of admission is to brand those who accept its benefits

¹ Under the recent state law of compulsory vaccination at private expense Californians have been compelled to expend annually for vaccinations alone an amount of money large enough to support an efficient system of medical inspection for half the schools of the State.

with the stigma of pauperism. In protecting the lives and fostering the health of children it must be remembered that we are not conferring a charity, but performing a duty.

(8) All the stock arguments against the operation of school clinics prove on examination to be untenable. To oppose the principle on which the institution rests is to deny the right and duty of society to engage in organized effort to conserve the raw material of the coming State.

(9) The school clinic affords to the school doctor much-needed relief from the monotony of routine inspection. The importance of this point cannot easily be overestimated. Experience proves that after the novelty has worn off the work of inspection, the physician is almost sure to become restless and discontented. He feels that he is not making any professional growth, as, indeed, is too likely to be true, considering the limitations and restrictions of his duties. Permission to give treatment both broadens his professional outlook and satisfies a legitimate and natural desire to accomplish objective results.

(10) The school clinic should be enlarged to include a psychological branch, in addition to the medical and dental work.

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CHAPTER VIII

SCHOOL DENTISTRY

Historical

SCHOOL dentistry had its beginning in Strassburg, Germany, in 1902. The undertaking was due entirely to the enthusiastic efforts of Dr. Ernst Jessen, whose name therefore deserves an honored place in the history of school hygiene. The Strassburg clinic is supported at public expense, and is open without charge to the school children of the city, rich and poor. Although attendance upon the clinic is entirely voluntary, the patronage has been very gratifying, as the following table will show.

TABLE III

	No. treated	No. available for treatment	Total cost.
1st year.	2666	17,119	\$1355.00
2d "	4967	17,054	1685.00
3d "	6828	18,073	2135.00
4th "	7491	18,607	2250.00

At first, more than half of those who offered themselves for treatment were impelled by toothache, but the number coming for other purposes rapidly increased. A pupil seldom refuses to attend, when urged by the teacher.

Results were evident from the beginning. After the repair of their teeth many children improved in health,

absence from school noticeably decreased, and in some cases discipline became easier. In Strassburg the clinic has the loyal support of the teachers, medical inspectors, and a large majority of the parents. One of its most valuable results is the influence it exerts as a constant object lesson in hygiene to both pupil and parent.

Before long the school authorities at Strassburg were overwhelmed with inquiries from every part of the world. By 1907, thirty-three cities and towns in Germany had instituted school dental clinics, and by 1909 the number was about fifty. They are now quite general in the larger cities, and traveling clinics for rural schools are coming to be popular.

In the smaller cities there are usually two or three school dentists, working on part-time. Wiesbaden, with 8000 school children, has six. Other cities, taking Strassburg for their model, employ full-time dentists, and admit them to pension rights on the same footing as teachers.

The cost for salaries, materials, and up-keep of clinics is sometimes met entirely by public taxation, and sometimes in part by private philanthropy; but in either case the treatment is free to the pupil. The per capita expense in Germany is ridiculously small. As shown by the above table, the cost in Strassburg is less than twenty-five cents a year for each child treated. Of forty-nine cities reporting in 1909, the cost per child was greater than this in only four.¹

¹ Other cities in Germany, such as Mannheim, Stuttgart, etc., prefer to send the child to a private dentist of his own choice and to

In England, school dentistry has had a rapid development, though the sentiment there is less favorable to the free treatment of children whose parents can afford to pay. The Cambridge Dental Institute for Children, one of the best known of England's school clinics, was organized in 1907 at private expense, and was taken over after two years by the Borough Council. Before the work began in 1908, the average number of unfilled carious teeth per Cambridge child was 1, 2, 3, and 4 for the ages 6, 7, 8, and 9 respectively. After three years the number had fallen to .3, .6, 1.5, and 1.6 for the same ages. In 1908, 24 per cent of the children accepted treatment; in 1909, 25 per cent; and in 1910, 39 per cent. By this time 72 per cent of the children had sound, or artificially sound, teeth; before the work began, only 33 per cent. Of those urged to take treatment the first year, and refusing, 40 per cent accepted treatment later.¹ The greatest problem in Cambridge has been to get parents to bring the children, even though the treatment is absolutely free. Experience in other English cities proves that even a nominal charge dooms the school dental clinic to failure.

One point in the Cambridge plan deserves special mention; namely, the concentration of effort upon the younger children. When the funds available are inadequate to the task of putting in order the teeth of all the children, the Cambridge plan insures the greatest good pay the expense of the dental work done, rather than to employ a school dentist. Of course it matters little who does the work so long as it is really done.

¹ See Wallis, *School Dental Clinics*. (Reference 6.)

to the greatest number. The average cost of keeping a child's teeth in repair throughout its school life, beginning with the first year, is probably less than the average cost of one treatment for the older child whose teeth have been neglected, and the good accomplished is proportionately greater. When this is done with every entering class the total expense involved is not large, and the teeth may thereafter be easily kept in satisfactory condition with but slight annual repairs.¹

In the United States, dental clinics have been established in New York, Chicago, Philadelphia, Cleveland, Los Angeles, and in nearly all of the other large cities. Many of the smaller cities are following the example. Boston is fortunate in the establishment of the Forsyth Dental Infirmary, made possible by the generosity of John Hamilton and Thomas Forsyth. The institution is housed in a magnificent building and is endowed with \$1,000,000 for maintenance. The gift is entirely for the benefit of Boston children under the age of sixteen years. Practical instruction in mouth hygiene is given, a dental museum is supported, and a room is available for public lectures. The institution also supports a research fellowship for the investigation of dental diseases.

Dental clinics should be free

For the most part, the school clinic in the United States is conducted for the benefit of indigent, or semi-

¹ The same plan is being followed in West Newton, Massachusetts.

indigent, children. It is frankly a charitable institution, belonging in the same category as orphanages, poorhouses, etc. It is also different in that much of the dental service is rendered gratuitously by local dental associations. In those cases where the dentist receives pay for his school work the expense is usually borne by charitable organizations, and not by the school.

The objections urged against the public support of free dental clinics are the same as those urged against school feeding, and precisely the same as those urged a few generations ago against free public schools: namely, that the people would be pauperized, that parental responsibility would be lessened, and that the income of private practitioners would be jeopardized. Experience proves that the first two objections are groundless. Parental responsibility is created rather than destroyed, and pauperization is no more caused by free school dentistry than by free textbooks and tuition. It is not even probable that the income of private dentists would be sensibly affected. The universal care of children's teeth in the schools would soon make the dentist habit universal, so that in a few years all persons beyond school age would be patrons of the private dentist, instead of the present 10 or 15 per cent. Moreover, many of the wealthier classes who now patronize private dentists for their children would continue to do so, even if free school clinics were established. The larger part of the work which is done by the free dental clinic would otherwise not be done at all. The good it accomplishes is clear gain.

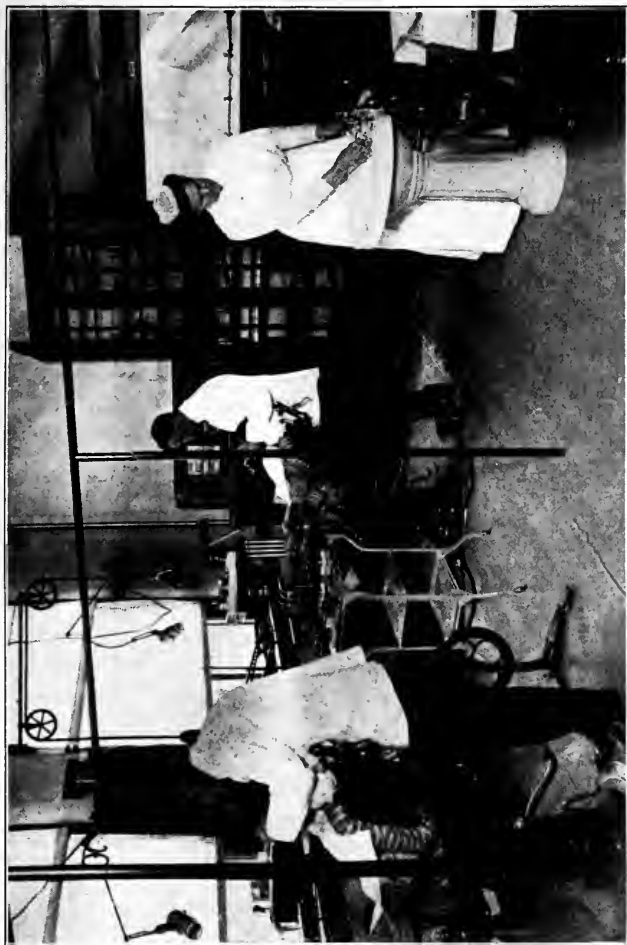
Anyway, it is the welfare of the child which is sought, not the aggrandizement of a profession. By the wholesale methods used in the schools, the cost of dentistry is reduced to about one third of what it would amount to if done by private dentists. There is no reason why society should neglect the teeth of children in the interests of private dentists, any more than it should yield up their bodies in the interest of the private manufacturer who fattens on child labor.

We seem, indeed, to be on the eve of a great dental crusade, — a crusade which promises to make the public-school dentist as familiar a personage as the superintendent himself, and fully as indispensable. There is no alternative to the German method.

In order to expedite his work, the school dentist stands in need of an assistant, just as the school doctor must have his nurses. Laws need to be enacted legalizing the profession of the school dental nurse. The dental nurse, on proper certification, by examination or otherwise, would be permitted to examine teeth in the schools, clean them, and apply local treatment to allay pain. A large share of the school dentist's time would thus be saved.

Preventing dental decay

At least 80 per cent of the children in our schools have seriously defective teeth. In the upper grades, to be sure, many of these dental disabilities have been repaired. But a repaired tooth, after all, is only a makeshift. It is always in danger of a functional or organic breakdown.



A SCHOOL DENTAL CLINIC IN ROCHESTER, N. Y.
From Gulick and Ayres' "Medical Inspection of Schools." By permission of Russell Sage Foundation.



Orthodontia restores the jaw to normal shape.



Teeth like these can be made straight.

CROOKED TEETH

Modern dentistry is preventive in nature, and teaches that teeth need not necessarily decay at all. With a few exceptions, such as those found in certain cases of general faulty development, or conditions resulting from acute diseases, teeth may be kept from decay by the simple device of keeping them clean.

The toothbrush cannot be relied on for this purpose. Not over twenty children out of a hundred use a toothbrush with needed regularity, and hardly any of these know how to use it correctly. Most of them brush with a crosswise stroke instead of with an up-and-down motion. Even when correctly used the brush does not insure that every part of the tooth surface, inner as well as outer, will be kept clean. The latest and best method of insuring complete cleanliness, and thus guarding against decay is as follows: —

As soon as the child has cut his first set of teeth, an attempt is made to remove plaque formation as rapidly as it occurs. Plaques are deposits in and under which acid-forming bacteria find lodgment. Decay of teeth is due primarily to those bacteria of the mouth which produce lactic acid. This decay takes place under the plaques. Consequently prompt removal of this deposit insures the teeth against decay. To detect the plaques, which are often invisible to the eye or even the touch, the teeth are swabbed with a "disclosing solution" made of the tincture of iodine and a little glycerine. After the teeth are washed with water, the solution leaves the plaques stained brown, while the rest of the tooth remains white. The brown spots or

placques are now rubbed with a moist silica preparation, and dental ribbon which is treated with the same material is run between the teeth.

This procedure repeated about twice a month keeps the teeth relatively free from plaques. It is necessary, however, to visit the dentist at least every six months for a more thorough treatment than can be given by the parent at home. This method followed conscientiously will prevent decay, give the enamel a beautiful luster and save at least seventy-five per cent of the usual expense for dental repairs.

At best, dental repair is a purely mechanical process which gives evidence to the world of previous dental neglect. In only a restricted sense is it a hygienic measure. The method just described, combined with the proper care of the gums and surface of the tongue, assures a degree of oral cleanliness which defies the assaults of the bacteria of the mouth.

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CHAPTER IX

TRANSMISSIBLE DISEASES

THE mortality in the United States from measles, scarlet fever, whooping-cough, and diphtheria amounts every year to more than twice the loss of life on the field of Gettysburg. On the basis of the knowledge which we now have regarding the causes of these diseases and the modes of their transmission, probably more than half of this loss should be looked upon as absolutely preventable. The annual needless mortality from this cause, therefore, exceeds the slaughter in most of the bloodiest battles of the world's history. Thousands of other deaths result from complications following children's transmissible diseases.

The school as a factor in the spread of contagious diseases

For some of this loss the school is directly responsible, particularly in the case of measles and diphtheria. Statistics collected from many parts of the world have established this beyond doubt. When society forcibly brings children together in the public school it is morally responsible for the sickness and deaths which result from such compulsory contact.

Thus Körösi found that for a large number of German cities, taken together, the average number of cases of measles per month, over a period of eighteen

years, was less than one sixth as great during vacation as for the school months. Dr. Schaefer found similar differences for Hamburg, though the vacation decrease for scarlet fever and diphtheria was much less marked than for measles. In Chicago, for the two years 1899 and 1900, the average monthly frequency of both scarlet fever and diphtheria was more than twice as great during the school months as in vacation.

The following curve shows the average monthly mortality from measles in the city of London for the

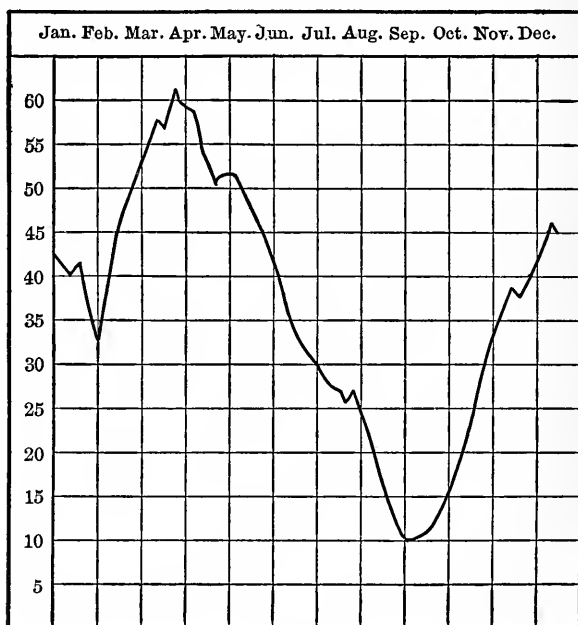


FIG. 3

Weekly average of deaths from measles in London, England, summed up for ten years, 1900-1910. See influence of vacation. (Fairfield.)

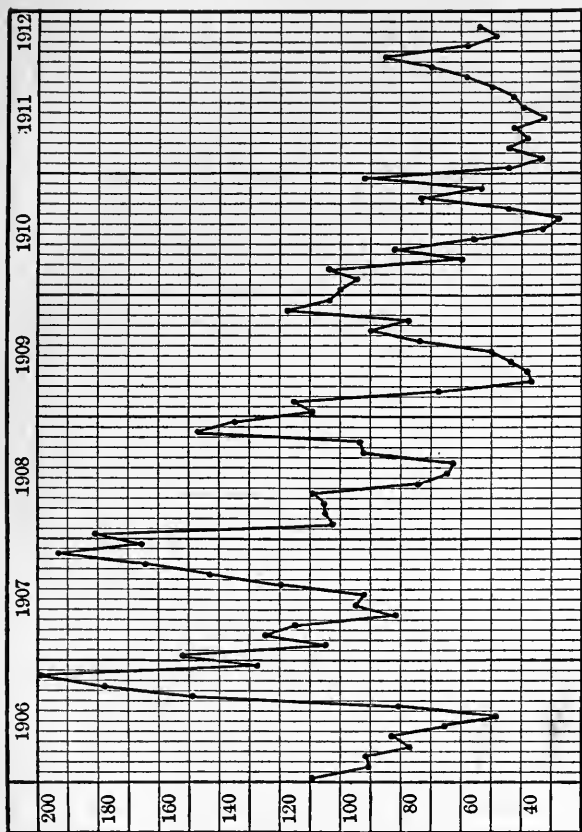


FIG. 4.

Curve showing number of cases of diphtheria in Halle, Germany, by months for the years 1906-1912.
(Dr. Drigalski.)

years 1900 to 1910, averaged together. Attention is called to the marked influence of even the short vacation there given.

Fig. 4 shows a similar influence of the school on the prevalence of diphtheria in Halle, Germany, for the years 1906 to 1912 taken together.

The school as a means of controlling contagious diseases

However, in spite of the dangers which the school involves for the spread of contagious diseases, it affords at the same time unexcelled opportunity for their control and prevention. Everywhere the medical supervision of schools has accomplished much in this way. In the year 1906-07 medical inspectors discovered the following cases of contagious diseases in the public schools of Massachusetts:—

TABLE IV

Diphtheria.....	238
Scarlet fever.....	313
Measles.....	637
Whooping-cough.....	973
Mumps.....	367
Chickenpox.....	548
Influenza.....	276
Syphilis.....	36
Tuberculosis.....	115
Scabies (itch).....	1054
Pediculosis (head lice).....	7691
Impetigo.....	1568
Conjunctivitis.....	779
Ringworm.....	715
Other skin diseases, mostly contagious.....	1170

These cases were all discovered among children present at school, and their immediate exclusion must have prevented a vast number of infections otherwise inevitable.

Since medical inspection was instituted in Boston, diphtheria in that city has decreased 65 per cent and scarlet fever 75 per cent, and both are now less common in school months than during vacation. In other words, by vigilance the school department of hygiene can more than offset the increased danger of epidemics incident to school attendance. When we remember that 90 per cent of all deaths from these diseases occur before the age of 10 years, the importance of their prompt and efficient control through the school machinery readily becomes apparent.

Our ideas on the transmissible diseases of children are rapidly changing. Instead of waiting for these diseases to make their appearance, we now attempt to discover those conditions which favor them, in order that we may remove the soil most favorable to their growth and dissemination.

Newer ideas about modes of infection

Recent studies of the contagious diseases of childhood have brought about a radical change in our viewpoint in regard to their modes of infection. In the past it was the custom of both school people and medical officers to concentrate their attention upon the various objects (fomites) which had been in rather close contact with the sick person, as the probable sources of

infection. Within the meaning of this term were included a great many articles, such as bedding, books, toys, clothing, furniture, letters, desks, pencils, money, etc.

At present the best informed medical men are paying less attention to fomite infection, and more to infection through personal contact. In other words, attention is now being fixed on *persons* rather than *things* as the sources of infection. Modern bacteriological investigations have pretty conclusively demonstrated that in the majority of instances diseases are spread directly from one individual to another, rather than through an intermediate object of some sort. With the old theory of fomite infection, a great amount of time, energy, and money was expended on methods of disinfection, all to very little purpose. To-day far more efficient results are obtained by discovering, isolating, and controlling the individual carrier of the disease. Transmissible diseases are, of course, transmitted only by means of living, active, micro-organisms of some sort. We are fast learning that these living organisms, or germs, which are either plant or animal in nature, cannot ordinarily live long outside of their particular host. For this reason we believe less to-day than formerly in dust infection, air infection, book infection, infection through clothing and the like.

Danger of the common cup, common towel, etc.

Contact infection is undoubtedly the commonest and by far the most certain mode of infection. But

contact infection does not exclude infection by means of various objects which may carry *fresh* material from the infected individual. Thus, diphtheria germs may easily be carried from the mouth of a sick child to the mouth of a well one by means of a pencil, provided the pencil has very recently been in the mouth of the child ill with diphtheria. Similarly a handkerchief used in common by a well child and one sick with measles easily carries the infection to the well child.

What is said in this connection is not to be construed as a vindication of the common drinking-cup, which is always dangerous. Davison, who made bacteriological examinations of a large number of public drinking-cups, found that nearly all harbored dangerous germs, and that 37.5 per cent bore the tubercule bacilli. Bensen's experiment of allowing diphtheria patients to drink *once* from a glass sterilized for the purpose demonstrated that germs of the disease were deposited in from 25 to 40 per cent of the cases. Measles, scarlet fever, whooping-cough, tuberculosis, and syphilis are known to be transmitted frequently in this way. The common drinking-cup in public places has been legislated out of existence in more than a dozen States since Kansas set the example in 1909. By 1911, more than forty railroads in the United States had substituted individual cups.¹

The common cup and the common towel will both have to go. The best substitute for the former is a

¹ Common drinking-cups on inter-state trains were prohibited by federal regulation in 1912.

rightly constructed drinking-fountain, of which several are on the market. Individual cups are usually not kept clean, and are too often "borrowed." The common towel should be replaced by absorbent paper towels, which are used once and then discarded.

It has been shown also that books are capable of transmitting diseases, though the likelihood of their doing so has probably been exaggerated. At any rate, guinea-pigs have been inoculated with tuberculosis and other diseases by preparations made from library books. The danger from this source is probably sufficient to justify city boards of health in making daily reports on contagious diseases to public libraries, and books known to have been recently used by infected persons should be disinfected by the moist, hot air method. This requires exposure of the books for about thirty-two hours in an atmosphere of 80° C. (176° F.) and 30 to 40 per cent humidity. The method is said not to be injurious to the most delicate book.

The modes of transmission just mentioned are in reality to be classed with contact infections. What is meant, then, by contact infection is contact with the virile specific germ of the disease, either directly through the patient or indirectly by means of an object which carries *fresh* material from the patient. It is not denied that infection by air or by fomites does sometimes occur, but the evidence to-day is all against these modes in the great majority of cases.

Air not a common source of infection

It is not unnatural that air should have been so long considered one of the chief vehicles of infection, for it has been relatively few years since the germ principle of disease was discovered. Chapin says, "Until this germ idea was well established as a fact, the infective material was supposed to emanate from the surface of the body and from moist soil and decomposing matter of all kinds. Contagious diseases were known to arise without any apparent connection with other cases, and what could be more natural than to assume that the invisible, imponderable *materies morbi* is mixed with and carried by air?" Even to-day one finds some educated, as well as many ignorant, individuals and some entire communities believing that stagnant pools of water breed typhoid, that "sewer gas" may give rise to diphtheria, that drafts of air may cause pneumonia, that air from marshes gives rise to malaria, etc. These and many similar delusions persist, despite the fact that we now possess abundant evidence to the contrary. While it is possible that air may at times carry the germs of some diseases, it is now acknowledged by those most entitled to an opinion that air does not often carry germs in a condition capable of producing infection. That diseases are often spread in street-cars, trains, churches, schools, theaters, and other crowded places is, of course, a matter of common knowledge and experience; but these instances are satisfactorily explained by the fact that a large number of

individuals are here associated in close personal contact. It is easy under such conditions for infection to spread from one individual to another by means of the fine spray produced by coughing, sneezing, laughing, and the like.

Isolation of "carriers" versus school closing

The practical abandonment of the old idea of fomite and air infection, except in rather rare and exceptional instances, has resulted in an entire change of procedure in respect to the control of contagious diseases in schools. The time-honored method of closing and disinfecting a school during an epidemic of measles or diphtheria is based on the theory of fomite and air infection in the school. This habit, still in practice in most places, results in loss of school time and expense to the school department. Worse still, many infected pupils are allowed to play about the streets among well children, and thus constantly spread the infection. The modern practice, which gives far better results, is to isolate the sick children and those believed most likely to be capable of carrying infection, while the school is kept in operation.

It is now well understood that individuals who are not themselves sick may often carry the germs of certain diseases in their bodies. This is true of diphtheria, typhoid fever, meningitis, pneumonia, influenza, tuberculosis, and probably of scarlet fever, measles, whooping-cough, mumps, and some other diseases. Such persons as carry in their bodies the germs of a dis-

ease without themselves being sick, are known as "carriers."

Dr. Chapin has remarked that probably the most important discovery bearing on preventive medicine, since the demonstration of the bacterial origin of disease, is that disease germs frequently invade the body without causing disease. Where the throats of school children have been examined by the culture method during an epidemic of diphtheria, from 10 to 40 per cent of apparently well pupils have often been discovered who were carrying diphtheria bacilli in their throats, and were quite capable of giving the disease to others. In an epidemic of diphtheria which occurred in Berkeley, California, in 1906, Dr. George F. Reinhardt found 25 per cent of the well pupils to be carriers. Prompt isolation of both the sick pupils and the carriers resulted in the control of the epidemic.

Of 4526 contact cases among wage-earners, examined in Providence, Rhode Island, during a diphtheria epidemic, 14.4 per cent were found to have the diphtheria bacilli present in their throats. It was significant in this instance that women were infected much oftener than men; the explanation being that women are in more constant and intimate contact with sick children than men are.

The subject of contact infection cannot be dismissed without reference to atypical cases of transmissible diseases. Formerly it was supposed that most if not all diseases exhibited definite, characteristic symptoms, and that mild atypical cases either did not exist,

or occurred infrequently. Now we know that many such atypical cases occur, and that, because of the fact that they often pass unrecognized, these cases are frequent sources of epidemics. Many such atypical cases have been observed in diphtheria, influenza, scarlet fever, smallpox, and typhoid fever, and there is an evidence of such cases in most other infectious diseases.

The problem to-day is as much one of discovering mild, atypical diseases and carriers of diseases as of locating the ordinary cases. With the recognition of all or most of these carriers and atypical cases the control of epidemics becomes a relatively simple matter. As long as mild, unrecognizable cases and carriers are allowed to go about freely, no possible good can result from the closing of schools. With the recognition and isolation of these cases, the closing of a school (with few or no exceptions) is not only unnecessary but positively undesirable and even harmful, for the unrecognized, mild, atypical cases and carriers may then freely spread disease among other children.

In epidemics of infantile paralysis, epidemic meningitis, and possibly a few other diseases, it may occasionally still be necessary to resort to the closing of schools, but if this procedure is unaccompanied by isolation of the exposed as well as the sick it can result in little good. As regards smallpox the prompt vaccination of all unvaccinated children during the earliest days of an epidemic offers so perfect a protection to the well that closure of schools becomes an entirely unnecessary and even harmful procedure.

Ages at which transmissible diseases most often occur

It is most important for schools to make accurate collections of data in respect to transmissible diseases, and to exhibit this so far as possible in a graphic form by means of charts and the plotting of curves. By this

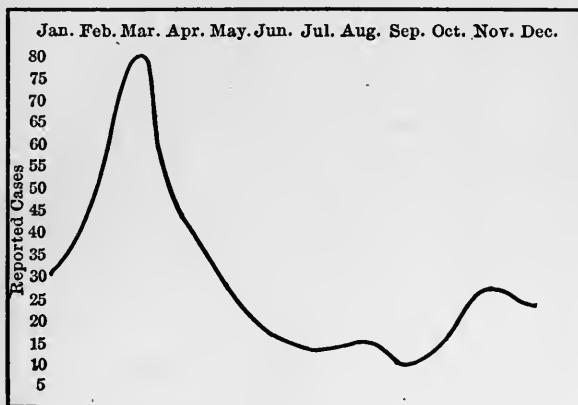


FIG. 5

Curve indicating average seasonal occurrence of all children's diseases in the Berkeley Schools for the years 1906-1910. Note that the curve reaches its height in March.

method, information can be instantly grasped and the problem of control can be more easily solved. The value of this procedure will be evident from the following study, made in the schools of Berkeley, California.¹

A simple but instructive curve plotted from the average monthly reports of all transmissible diseases in Berkeley from 1906 to 1910 shows that the curve

¹ Hoag and Hall, "A Preliminary Report on Contagious Diseases in Schools." *Bulletin, American Academy of Medicine*, 1911.

reaches its maximum in March. This clearly indicates, then, that March is the sick month of the year in this community. This period is coincident with the worst weather, when windows at home and at school are kept closed and pupils are at the same time in close personal association with one another and thus offer abundant opportunity for direct infection by contact.

Plotting a combined age-curve for chickenpox, diphtheria, mumps, measles, scarlet fever, whooping-cough, typhoid, and tuberculosis, it appeared that 42 per cent of the diseases occur between the ages of 5 and 10 years, and only 16 per cent between the ages of 10 and 15 years; 79 per cent occur between birth and 15 years; only 13 per cent after 20 years. In other words, 68 per cent of the diseases in question occur in children of school age. Another 21 per cent occur in children too young to attend school.

Of the reported cases of measles, 28 per cent occur under 5 years; 48 per cent between 5 and 10 years; 13 per cent between 10 and 15 years; or a total of 89 per cent under 15 years.

With mumps, only 6 per cent of the cases occur under 5 years; but 50 per cent occur between 5 and 10 years, and 26 per cent between 10 and 15 years.

In chickenpox, 61 per cent occur between 5 and 10 years, and 14 per cent under five years; while 18 per cent occur between 10 and 15 years, and only 7 per cent occur after 15 years.

In scarlet fever, 40 per cent occur between 5 and 10

years, 28 per cent between 10 and 15 years, and 15 per cent under 5 years.

Diphtheria gives 23 per cent for children under 5 years, 35 per cent from 5 to 10 years, and 18 per cent from 10 to 15 years, the cases rapidly diminishing from this age on.

In whooping-cough we get a different sort of result, as 52 per cent occur under 5 years of age, 39 per cent between 5 and 10, and only 5 per cent after 15 years.

Typhoid exhibits no claim as a children's disease, as only 11 per cent occur under 10 years of age, and only 3 per cent are reported in children under 5 years.

In respect to tuberculosis, very few cases were reported among children; but we must remember in this connection that many latent general cases as well as some glandular and bone cases often fail to be reported.

CHAPTER X

TRANSMISSIBLE DISEASES

(Continued)¹

THE most frequent diseases of children of school age are: —

1. Measles.
2. Scarlet fever.
3. Diphtheria.
4. Whooping-cough.
5. Mumps.
6. Chickenpox.
7. Smallpox.
8. Tuberculosis.
9. Hookworm disease.
10. Infantile paralysis.
11. Epidemic meningitis.
12. Eye diseases.
13. Skin diseases.

These diseases will be discussed in the order named, and such symptoms and complications will be given as will be useful to the non-medical reader.

Further details concerning the transmissible diseases of children may always be obtained in a useful form from the various state boards of health, as well as from the city boards of health of the larger places. Some of these the reader ought to procure on account of their practical descriptions and their readily applic-

¹ The writers acknowledge their debt, in the preparation of this section, to Dr. James Kerr's *Transmissible Diseases*.

able methods to school needs. The following Boards of Health publish particularly important and interesting bulletins and reports: —

California State Board of Health — Sacramento.
Minnesota State Board of Health — St. Paul.
Indiana State Board of Health — Indianapolis.
North Carolina State Board of Health — Raleigh.
Michigan State Board of Health — Jackson.
New York State Board of Health — Albany.

1. MEASLES

Measles is the most infectious disease of childhood, as well as the commonest. Practically every child who is exposed takes it the first time of exposure. It is most common during the first five years of life, but is often contracted between five and fifteen years, and occasionally during adult life. It rather rarely occurs during the first six months of life, but occasionally infection takes place before birth when the mother is suffering with the disease.

While measles is not ordinarily regarded by the public as a serious disease, yet it is safe to say that it has a general mortality of not less than 4 per cent. Under bad hygienic conditions this mortality is often higher and may reach 10 to 40 per cent, while under very favorable conditions the percentage may be very low. The highest death rate is reached in the first and second years of life.

In Aberdeen, Scotland, the statistics for twenty years show that of children under 3 years contracting measles 1 in 12 died, while the average rate for children

over 3 was 1 death in 120 cases. The mortality was highest in the second year, 1 in 9. The importance of postponing the disease is, therefore, obvious. An epidemic of measles in the kindergarten or lower grades should always be regarded with apprehension. The mortality from measles is always higher in cases in which other diseases exist, such as tuberculosis, syphilis, general malnutrition, etc.

Complications. The mortality and serious morbidity of measles are not usually due to the toxins of the disease itself, but to complications accompanying the disease. The most important complications are those which affect the respiratory organs, such as bronchitis, broncho-pneumonia, and tuberculosis. Other less serious complications are those of the eyes, ears, nose, and throat.

After effects. The most serious after-effect of measles is tuberculosis. This occurs in a considerable number of cases, and for this reason the child should always receive the best possible hygienic care after recovery from the acute stages.

Symptoms. Those who are intimately concerned with children ought to be familiar with the common symptoms of children's diseases. The following are the usual and most evident indications of measles: —

1. Catarrh of eyes, nose, throat. The child *seems* to have a cold.
2. General lassitude.
3. Fever.
4. Eruption.

The child usually begins to sneeze and blow his nose; his eyes soon become red and watery; often there is considerable cough; sometimes there is a chill; bluish-white spots surrounded by a red area are usually seen on the mucous membrane of the mouth, opposite the double teeth. These spots make their appearance before the rash comes out. The rash usually shows about the fourth day of the disease, and begins on the face, neck, and head most frequently, and soon extends to the trunk, arms, and legs. The eruption begins as papules, or small reddish spots, occurring in groups which have tendency to form irregular crescents. The papules do not form vesicles (small blisters), or pustules.

Prevention. The great infectivity of measles, and the fact that it is most infectious before it can be easily recognized, make its prevention a matter of extreme difficulty. While compulsory notification cannot have the results which have been obtained with other infectious fevers, with our modern methods of medical inspection in schools much good ought to be accomplished.

Closure of schools has been found a very unsatisfactory method, and is productive of an enormous waste of school time. To secure a really efficient method of protection it will be necessary for the medical officers of schools to acquire an accurate knowledge of the health history of the school children. This may be accomplished by keeping a list of all the diseases which the children have had. Provision should be made for this on the child's "Physical Record Card."

If during an outbreak of measles it is discovered that certain children have already had the disease, they need not be excluded from school. When a case of measles occurs in a class, all children who have not had the disease should be at once excluded.

Rules on this point have been formulated for the London County Council, by Dr. Thomas, as follows:—

(a) A child attending other than an infant school, who has already had measles, need not be excluded.

(b) A child attending other than an infant school, who has not had measles, must be excluded until the Monday following the expiration of fourteen days from the occurrence of the first case.

(c) A child attending an infant school, whether or not it has measles, is excluded for the same period.

Disinfection. Disinfection of rooms at school or at home, as ordinarily carried out, probably has little or no effect, and is consequently a loss of time, energy, and money. Ordinary airing and cleaning will accomplish all that is necessary, especially if the rooms are exposed to bright sunlight. Bedclothing and personal clothing should be thoroughly washed and aired.

Willful exposure. Children should be protected as long as possible against infection with measles. It must not be forgotten that in any case, whether young or old, complications, such as tuberculosis, pneumonia, meningitis, ear disease, and eye troubles, may occur. The individual who willfully exposes a child to measles (a procedure which is far from infrequent) is guilty of criminal ignorance.

2. SCARLET FEVER

Scarlet fever is one of the most serious of the diseases which affect children, and its after effects are particularly to be dreaded. It occurs at all seasons, but in epidemic form is most likely to occur during the fall and winter months.

Very little is known concerning the relation of temperature and climate to this disease, but like other eruptive diseases of childhood it is usually less severe in warm than in cold climates.

Age occurrence. Scarlet fever is most common in children between 5 and 10 years of age, and more cases occur at the age of 6 years than at any other. Under 1 year and over 15 years of age relatively few cases of scarlet fever are observed. The disease occasionally manifests itself in adult life, but out of 167,840 cases recorded by Ford Carger there were only 77 in individuals past 50 years of age. There exists a great difference in the degree of susceptibility of individuals toward this disease, some being practically immune, while others exhibit a high degree of predisposition to infection with it.

Modes of infection. As with most other diseases, we now know that scarlet fever is most often spread by direct contact. Although the specific organism causing the disease has not yet been positively identified, it is probably present in the secretions of the nose and throat. There is reason to believe that the organism, whatever it is, may under some conditions be spread by

carriers. Epidemics sometimes occur through infected milk supplies. Air infection plays little or no part in spreading this disease, and there is no evidence that water ever carries it.

In respect to fomites, Kerr remarks that these may play considerable part in the dissemination of infection. He further states that the clothes of a patient are highly infectious, and may remain so for a long period. It is difficult, he says, to accept without some reserve the tragic stories, so frequently related, of infection clinging to clothes or toys for over twenty years and then breaking out when the articles are disturbed. There can be little doubt, however, that clothing, books, letters, toys, and bedding can retain the virus alive for months, especially if they are excluded from light and air.¹

Chapin, however, is disinclined to place much reliance in the various alleged cases of fomite infection in any of the transmissible diseases, and says that the amount of disease caused in this way is relatively very small. We have no need for such a theory and a much more satisfactory explanation is at hand.²

This explanation Chapin finds in the existence of healthy carriers and atypical cases. He also points out that if infection from fomites really occurred as often as has been supposed, transmissible diseases would be much more prevalent than they are. There is no good epidemiological evidence that diseases are spread by

¹ Kerr, James, *Infectious Diseases*.

² Chapin, C. V., *Sources and Modes of Infection*.

fomites except in cases due to spore-forming bacteria. In schools, scarlet fever is not spread as readily as measles or diphtheria.

Duration of infectiousness. The patient is capable of transmitting the disease from the time his symptoms are first noted and until the catarrhal stage has disappeared. As long as there is any inflammation in the nose or throat, or any discharge from the ears, the individual is infectious. It is also probable that infection spreads from suppurating glands in the neck. It has always been supposed that the desquamating (peeling) skin was highly infectious, but to-day this is regarded less seriously than formerly, although the possibility of infection from this source cannot yet be entirely ignored.

On an average, a child will be a possible source of infection for about six weeks, but each individual case must be judged by the disappearance of the catarrhal symptoms of the nose and throat, the ear discharge, the discharge from the lymphatic glands, and last, and probably of least importance, the disappearance of peeling. After exposure, a susceptible individual should be isolated for about ten days, as a matter of precaution.

Period of Incubation. The symptoms of scarlet fever develop rapidly, the period of incubation in the majority of cases not exceeding seven days. More often it is not more than four days, and it is probable that most cases do not require over two or three days before they exhibit symptoms of the disease.

Early symptoms. For the guidance of the non-medical reader the following early symptoms of scarlet fever are given: —

A. General

Fever.
Sore throat.
Headache.
Vomiting.
Chilliness.
Malaise.

B. Specific

Quick change from good health to sickness.
Abrupt rise of temperature.
Rapid pulse out of proportion to fever.
Sore throat.

Of these symptoms the first four are the most significant in children. Vomiting and sore throat are almost invariably present. The rash usually appears in about twenty-four hours from the time of the appearance of the first symptoms. It usually appears first in the neck and chest, gradually spreading downward to the arms, trunk, and legs. The rash consists of minute points on a surface somewhat less red. The points are very closely set together, are no larger than half a pinhead, and are not much raised, at least not sufficiently to be felt by the finger. The appearance of the tongue is often somewhat characteristic. At first it is heavily coated and white. Later it has a "white strawberry" appearance. This is succeeded by a "red strawberry" stage.

Mortality. Scarlet fever has not a very high mortality. In England it is said to be from 2 to 5 per cent. This varies greatly, however, with the age of the patient. For children under 1 year of age it may reach as high as 21 per cent, and for children between 1 and 2

years of age, 16 per cent. In general, the younger the patient, the higher the death rate. From 10 to 15 years of age is said to be the period of fewest fatalities.

Complications. Scarlet fever has associated with it more serious complications than has any other of the eruptive diseases of childhood. Of these complications the following are the most important: —

1. Nephritis (Bright's disease).
2. Arthritis (articular rheumatism).
3. Heart disease: —
 - (a) Endocarditis.
 - (b) Pericarditis.
4. Adenitis (inflammation of the lymphatic glands).
5. Otitis media (inflammation of the middle ear).
6. Rhinitis (inflammation of the nasal passages).
7. Tonsillitis.
8. Broncho-pneumonia.
9. Meningitis.
10. Diphtheria.

Nephritis, or Bright's disease, is not rare in cases of scarlet fever, even in mild cases, and sometimes it persists as a permanent organic disease of the kidneys. It is not as yet clear whether this complication is caused by the toxin or by the germ of scarlet fever, but it is probable that both play an important part.

After 10 years of age nephritis is rarely encountered as a complication. On the other hand, when Bright's disease occurs in children under ten, scarlet fever ought to be thought of as a possible explanation, as it may be present in a mild, unrecognized form. Kidney complications probably occur in not less than 10 per cent of the cases.

Arthritis, or rheumatism of the joints, is said to occur in about 4 per cent of all cases, and in more than half of all these it appears in children past 10 years of age. Muscular rheumatism also appears in some scarlet fever cases and is probably caused by the toxins of the disease.

Heart complications are not very common, but when they do occur they are most often coincident with rheumatism. Of 22,096 cases of scarlet fever observed, endocarditis — inflammation of the lining of the heart — appeared in only 0.58 per cent of the entire number.

The commonest complication of all in scarlet fever is *otitis media*, or inflammation of the middle ear. Usually about 12 per cent of cases are observed to be thus affected. The germs setting up the inflammation may be carried either through the eustachian tube from the nose and throat, or by means of the blood.

The discharge which takes place from one or both ears may be transient in character, or may last for months or years. This condition may, of course, produce more or less permanent deafness, especially in cases which do not receive proper treatment. It seems very probable that discharging ears may be the cause of scarlet fever infections in many cases. Sometimes a mother will attribute a case of scarlet fever in the family to the fact that some clothing or toys which were not completely disinfected at the time of occurrence of a previous case, perhaps years before, had been recently unpacked and handled. An investigation in such cases often demonstrates the presence of a

discharging ear in the previous case, which has persisted since the time of the scarlet fever attack. It is far more reasonable to attribute infection to such a source rather than to any organisms remaining active for a long period in clothing.

Diphtheria, following scarlet fever or associated with it, is often observed. This may in part be explained by the fact that the child may have been a diphtheria carrier and that the germs have become active during the attack of scarlet fever, or that the resistance has become reduced because of it. Until antitoxin was employed, this complication was the cause of a fearful mortality, but with its early and general use the danger has been greatly reduced.

3. DIPHTHERIA

Diphtheria is one of the few diseases for which a specific treatment has been discovered. The use of antitoxin has not only greatly reduced the mortality from the disease, but has also decreased the seriousness of sickness incident to it. The bacillus which causes diphtheria was discovered by Klebs in 1883, and much of the modern treatment of germ diseases dates back to this period.

Age. Diphtheria occurs most frequently during the first ten years of life. Under 1 year of age it is not common, but it is met more frequently during the period from 2 to 5 years than at any other time. After 12 years of age it is relatively uncommon.

Modes of infection. Direct contact explains satisfac-

torily the greatest number of cases, although indirect contact, from the common use of such articles as pencils, handkerchiefs, towels, common eating-utensils, and the like, may account for a good many cases. Some epidemics appear to have originated in infected milk supplies.

Carriers are very common in diphtheria, and the control of the sick cases and carriers is usually all that is necessary to stop an epidemic of this disease. Chapin thinks that perhaps 1 or 2 per cent of the population carry the germs of diphtheria constantly in the nose or throat. Among those that have been in close contact with diphtheria cases the percentage of carriers is usually pretty high; 10 to 15 per cent is not an unusual proportion under such conditions. In schools where there have been epidemics of diphtheria it has not been uncommon to discover that from 25 to 50 per cent of the well children are carriers of the bacillus, and are therefore capable of spreading the disease.

It often happens that atypical cases of diphtheria occur, cases which are so mild in character that they may even be overlooked by physicians. From mild cases of this type serious cases and even epidemics may result through the infection of susceptible individuals. Every case of definite sore throat ought to be regarded as a possible case of diphtheria, until proved not to be one. The only possible way to determine the facts is by use of the culture method; i.e., the throat must be swabbed and the bacteria grown on an artificial culture medium for twelve to twenty-four hours, and then

examined bacteriologically. Every competent health officer now has facilities for such diphtheria examinations, and the public ought to make free use of the opportunities thus afforded.

It should never be forgotten that diphtheria and scarlet fever are often associated. Therefore, in scarlet fever, cultures from the throat should be taken as a matter of precaution.

The old idea that diphtheria may be spread by defective drains, "sewer gas," stagnant water, "bad air," and the like needs only to be mentioned to be condemned as a superstition. Fomites play no more important part in spreading diphtheria than they do in most other transmissible diseases. For infection to be carried in this manner the infective material must be relatively fresh. The domestic cat sometimes suffers from diphtheria, and there is sufficient evidence to lead us to believe that this animal may infect human beings who come into direct contact with it. Diphtheritic patches and ulcers sometimes occur on the udders of cows, and a few milk epidemics have been traced to such sources.

It is not possible to state just how long it takes the disease to develop in a susceptible person after exposure, but there is good reason to believe that it sometimes appears as soon as twenty-four hours. On the other hand, the germs may be carried in the nose or throat for days, weeks, or months, before any symptoms appear, while in other instances, as we have already learned, a carrier may show no symptoms of sickness at

all. Ordinarily about two or three days will be required for the disease to develop.

Symptoms. The prominent and common symptoms of diphtheria are as follows: —

- Fever.
- Headache.
- Malaise.
- Chilliness.
- Lassitude.
- Rapid pulse.
- Loss of appetite.
- Sore throat.
- Patches of whitish membrane in the throat.

Complications. Broncho-pneumonia may occur and is always a very serious complication. Inflammation of the middle ear (*otitis media*) is not rare, and sometimes the discharge contains diphtheria germs.

Paralysis of various parts is not uncommon, and is due to the toxins of the disease. Paralysis of the heart is the cause of many of the sudden deaths in attacks of diphtheria, or during early convalescence. In some cases the muscles of the eyes are affected; in others those of the legs, arms, throat, face, or the muscles of respiration. Sometimes the paralysis occurs in several parts of the body.

Mortality. Before the use of antitoxin, the death rate from diphtheria was very high, often reaching 25 or 30 per cent of the cases, while 25 to 40 per cent was not unknown. With the early use of antitoxin this terrible mortality has been reduced to from 3 to 14 per cent, depending upon the severity of the epidemic. If a

diphtheria case is treated with antitoxin serum the first day, death very seldom occurs; but every day of delay adds to the risk. It should be understood that antitoxin also affords protection against diphtheria in the cases of exposed persons, and it is especially important to administer it in the case of those who carry the germs in the nose or throat.

Control of an epidemic of diphtheria. A matter of prime importance in the control of diphtheria is to recognize the cases early, and isolate them. Next in importance is the discovery of carriers, and the isolation of these also. Last of all, no cases of either class should be allowed to mingle with other children (or adults) until examination proves that the germs of the disease have entirely disappeared.

It is probably never necessary for a school to be closed if the precautions just described are carefully observed, though it is, of course, necessary to clean and disinfect the desk and personal belongings of the children who are known to have been infected.

*Conclusions from the investigation of an epidemic in a Berkeley (California) School*¹

The existence of an epidemic of diphtheria in one of the schools of Berkeley afforded an opportunity to make an exhaustive trial of the control of diphtheria by strictly laboratory methods.

The local health authorities first became alarmed

¹ Abstracted from a Report by Archibald A. Ward and Margaret Henderson.

about diphtheria in Berkeley early in November. In October five cases were reported, four of them from the Lincoln School District. In the first half of November ten cases were reported, nine of them from the Lincoln School District and two of them resulting in death. Besides these reported cases, there were unofficial rumors of many others.

A great clamor arose among the inhabitants of the region, and those of other parts of Berkeley who heard of the epidemic, insisting on the closing of the school until the diphtheria should be over. But it was deemed wiser to keep the school open, excluding all children who showed diphtheria bacilli in their throats. If the school closed, all children would go out of the control and observation of the health officer. If it were open, they would remain segregated, new cases would be easily traced, and old cases more easily kept quarantined until free from infection. It was, therefore, decided to examine every child in the school, excluding all those showing diphtheria bacilli, and readmitting infected ones only after two negative cultures had been obtained from them at an interval of at least a week.

The school was then closed for the three days necessary to examine the cultures, and when it was reopened, those children showing diphtheria bacilli were sent home, together with their sisters and brothers. No attempt was made to disinfect the school at any time during the epidemic. The principal undertook to see that the desks of the children found to be infected

were washed in a 4 per cent formalin solution, and that their books and pencils were sent home with them. Beyond this nothing was done in the way of disinfection at any time.

About 475 children were examined, and 27, or about 5 per cent, were found positive. There was no attempt to quarantine these children; they were merely excluded from the school.

The first examination did not stop the epidemic and it was decided that the second one must be made more stringent. Various changes were made, for this reason, in the technique. Cultures were taken from the throat, as before, but, in addition, cultures were also made from the nose, on the same tube of blood serum.

In this second examination, 77 of the 550 children, or 14 per cent, were found to be harboring diphtheria bacilli. This meant the exclusion from school of a total of 125 children.

Conclusions

(1) The epidemic was due to three factors: (a) Existence of mild cases of diphtheria which, because of the lack of bacteriological examination, had gone unrecognized as diphtheria; (b) the insufficient length of quarantine in clinical cases; (c) germ cases following exposure and never showing clinical symptoms (carriers).

(2) Attempts to isolate all infected children had no effect on the course of the epidemic, so long as throat cultures only were made. When both nose and throat

cultures were made and all the children showing positive cultures were quarantined, the epidemic stopped.

(3) It is extremely important, in times of danger from diphtheria, that every sore throat, no matter how far it may seem to be from diphtheria, be regarded as suspicious until a bacteriological examination has proved it to be otherwise.

(4) It is such a frequent occurrence to have a positive culture follow a negative one that at least two negatives should be demanded for release from quarantine. No case should be released on clinical signs alone.

(5) It is possible to stop epidemic diphtheria in a public school by regulation of attendance by means of bacteriological findings.

4. WHOOPING-COUGH

Until recently the organism of whooping-cough was unknown. Now it is generally recognized as an influenza-like bacillus called the "*Bordet Bacillus*." Whooping-cough is very largely a disease of infancy and early childhood. If a child can be protected against the disease until he is five or six years old, his chances of taking it are very greatly reduced. The greatest number of cases probably occur in the fourth year, but the disease is common in children under 1 year of age, and sometimes occurs in babies less than 2 months old. After 10 years of age, whooping-cough is relatively rare, but occasionally adults are affected, and, in rare cases, the aged.

Mode of transmission. Whooping-cough is trans-

mitted very largely, if not exclusively, by direct or indirect contact. The disease is extremely contagious, although not as much so as measles. The period of infectiousness extends from the earliest catarrhal symptoms, which first appear as an ordinary cold, until the cough has ceased. One attack of whooping-cough practically protects for life against reinfection.

Not much is positively known about the period of development of whooping-cough, but this probably varies from one or two days to two weeks. If, after exposure, the disease has not appeared within fifteen days, there is little or no danger that it will appear at all.

Symptoms. It is highly important to understand that whooping-cough usually begins much like an ordinary cold, with cough, and that it is often if not usually unrecognized for a number of days. Generally the cough becomes progressively more severe, and by the end of the first or second week the paroxysmal character of the cough makes the case a clear one.

This paroxysm associated with the cough may occur a few or many times during the twenty-four hours. The child coughs violently in quick succession and is unable to get his breath; his face becomes very red or even purple, and he presents a rather alarming appearance. At last the breath is drawn in with a "whoop," which may or may not end the particular spasm. Vomiting usually occurs at the end of the "whoop," but sometimes precedes it.

Duration. One of the many unfortunate features of

whooping-cough is its long duration. On the average this covers a period of five or six weeks. The "whoop" may persist for a much longer period than this, and sometimes it continues for several months, or even for a year.

Complications. Whooping-cough should be regarded seriously for several reasons. First of all, it keeps the child out of school for several weeks or months; second, it causes a tremendous strain of the heart and lungs; third, it has many possible complications. Among these are: —

Hemorrhages in the eyes, nose, bronchial tubes, and occasionally in other localities, including the ear, skin, and brain.

Digestive disturbances.

Hernia (rupture).

Broncho-pneumonia.

Nervous complications of various kinds, such as convulsions, and, in rare cases, paralysis.

Heart strain not infrequently occurs in severe cases. This may result in permanent injury, but more often it is of temporary character.

Tuberculosis often follows long attacks of broncho-pneumonia, and is much to be dreaded in such cases.

Control. Whenever there is an epidemic of whooping-cough, every child with a suspicious cold and cough ought to be excluded from school and kept under observation for about two weeks. Such a precaution will greatly reduce the number of cases in a school. Children who develop the disease should be isolated for a period of about six weeks, and it is unsafe to allow them to mingle with other children until the "whoop" has disappeared. A slight cough without the "whoop"

may ordinarily be ignored, as this often persists long after all danger of infection has passed. A bacteriological examination for the presence of the specific germ of the disease will of course settle the question of the infectiousness of a case.

All expectorations should be carefully destroyed by disinfectants, or by burning. Disinfection of articles which may carry infection ought to be practiced as a matter of precaution, although there is probably relatively little danger of infection from such sources.

Children from families in which there is whooping-cough need not be excluded from school, if they themselves have had the disease. If they have not, unless over 10 years of age, they should be excluded for at least two or three weeks. After this they may return, but should be carefully watched for symptoms.

5. MUMPS

Mode of transmission. While the specific germ of mumps has not been discovered, there is no doubt as to the existence of such an organism. Some regard the disease as a septicæmia, or general infection in the blood.

Season has little to do with the occurrence of mumps, but age is a factor of much importance. The disease is not common in the very young, or in those past middle life. It most often occurs between the ages of 5 and 15 years. In the Berkeley, California, investigation (Hoag and Hall), 50 per cent of the cases occurred between 5 and 10 years, and 26 per cent between 10 and 15 years.

We are rapidly learning that most infectious diseases

are spread directly or indirectly from the secretions of the nose and throat, and in this respect mumps appears to offer no exception.

Mumps may be called a school disease. Epidemics in high schools and colleges are not uncommon, and they often appear also in barracks. The disease is not very contagious, the susceptibility of children to it being much less than in the case of other transmissible diseases of childhood.

It is contagious from the time of the appearance of the earliest symptoms, and probably usually remains so for several days after the disappearance of the swelling. The period of incubation varies considerably, but is usually from three days to three weeks, with an average period of about twenty days after exposure.

Symptoms. Often the swelling of the parotid glands (at the angle of the jaw) is the first symptom. In some severe cases there may be headache, pains in the back and legs, and vomiting and fever for about one day before the appearance of the glandular swelling. Pain often precedes the swelling of the parotid glands, and the glands may swell on one or both sides of the neck. Usually the swelling reaches its limit in two or three days, and then remains stationary for a few days, when it slowly decreases. Ordinarily the swelling completely subsides in a week or ten days from the beginning of the process. Other glands of the neck are occasionally affected, but in any event the course of the disease is nearly always mild and uneventful.

As a complication, swelling of the sexual glands (tes-

ticles or ovaries) occasionally occurs. This is rarely observed before puberty, but after this period it may appear in either sex. Other complications are not often met with, and need not be mentioned here.

Control. In the majority of cases the symptoms will not appear until at least a week after exposure. Consequently an exposed child who has not had the disease need not be isolated during the first week. After that it is well to practice isolation for a period of about two weeks. Second attacks are possible, but are so infrequent as to be negligible. Disinfection, except of desks and the personal belongings of the child, need not be practiced.

6. CHICKENPOX

While chickenpox is usually mild and harmless, yet this is not always the case, and in exceptional instances some severe complications may arise. A point of particular importance is that it is frequently confused with smallpox, every physician having seen cases of beginning smallpox diagnosed "chickenpox." At one time it was supposed that chickenpox was a mild form of smallpox, but since about 1870 there has been no controversy in regard to this point.

Varicella, or chickenpox, originates through infection only, but just how this comes about we are still in doubt. Most authorities doubt if this disease is ever carried by a third person or by fomites. It is also doubtful if air transmission plays any part in the spread of the disease.

The contagiousness begins as soon as the eruption appears, and probably continues until all crusts have fallen from the skin.

It is rare that an individual ever has more than one attack, but this does occur occasionally. Chickenpox is a universal disease, and is rarely altogether absent from large centers of population. It occurs most often in the epidemic form, soon after the opening of schools.

Chickenpox is so rare in adults that every such case ought to be very carefully distinguished from smallpox.

The early symptoms are: —

Fever.
Loss of appetite.
Restlessness.
Malaise.
Vomiting.
Nosebleed.

The eruption usually comes out in from one to four days after the appearance of the first symptoms, but sometimes the noticeable symptoms and the eruption seem to occur simultaneously. The eruption begins as small papules (little red spots), which soon change into vesicles (little blisters). These vesicles soon dry and in a day or so leave scabs, which usually fall off after two or three days. All stages of the eruption may be observed on the body at the same time.

Complications. Complications are very rare, but do occur in a number of different forms, as follows: —

Nephritis (kidney disease).
Arthritis (rheumatism).
Paralysis.

Chorea.
Infections.
Gangrene of skin.

Control. The child should be excluded from school from the time of the earliest symptoms until the scabs have disappeared.

7. SMALLPOX

An exact knowledge of smallpox is important, because in mild cases it is easily confused with chickenpox. It not infrequently happens that a case of smallpox is so mild that it does not even present the slight symptoms common to chickenpox.

Onset of the disease. In smallpox there is always some fever for a period of about three days before any other marked symptoms appear. With fever there is associated headache, general malaise, and often such symptoms as occur with a slight influenza. After the third day from the beginning of the symptoms the eruption comes out, and the person thereafter feels better for a time, or indeed does not again feel sick at all. "There is no other eruptive disease in which such experience as this can be noted; it is peculiar to this one."

The distribution of the eruption. On the third day, with subsidence of the fever, the eruption appears. It appears first on the face; later on the back of the hands and wrists.

In chickenpox the definite onset which characterizes smallpox is lacking. The early symptoms in chickenpox are usually insignificant, and the fever does not subside with the appearance of the eruption.

The red spots (papules) are not so hard in chickenpox as in smallpox, and they quickly form blisters (vesicles). The eruption is most abundant on the trunk and especially on the upper part of the back, while the face is fairly free.

Vaccination affords almost perfect protection against smallpox. The literature on this subject is so exhaustive that merely to mention the titles of the most important articles is out of the question. For a concise and conclusive argument, however, in favor of vaccination, the reader may be referred to *Vaccination: What it is; What it does; What its Claims are on the People*, issued by the New York State Department of Health.

Every individual ought to be protected against smallpox by vaccination, but in any event vaccination must be practiced at the time of any appearance of this disease among school children.

CHAPTER XI

TRANSMISSIBLE DISEASES

(Concluded)

8. TUBERCULOSIS

THE subject of tuberculosis has been fully discussed in the volume of this series called *The Hygiene of the School Child*, and it is, therefore, unnecessary to enter into any extended details at this point.¹

“Open” and “latent” tuberculosis. “Open” tuberculosis, by which is meant tuberculosis in the transmissible form, such as is found in unhealed tuberculous conditions of the lungs, is rarely met by school health officers in their routine work. Evidence of former bone tuberculosis is seen not infrequently in the form of deformed spines (kyphosis) or a shortened leg, usually caused by hip-joint disease. Scars in the neck most often represent former tuberculous lymph-glands which have either ruptured spontaneously or have been lanced. Occasionally one observes discharging lymph-glands of tuberculous nature in the neck or the groin, and, less often, abscesses in the back. Also, in relatively rare instances, cases of active pulmonary tuberculosis are found. In the main, however, tuberculosis in school children is of the latent type, discoverable chiefly by use of the Von Pirquet test.

¹ See also chapter XII of the present volume, “Open-Air Schools.”

That a very large number of children are afflicted with latent tuberculosis there is no possible doubt, and modern investigations point to the fact that most tuberculosis is acquired in childhood, even though it may not become evident for many years. It is the conviction of one of the writers, who has personally examined more than 100,000 school children, that most of the type which we call "malnourished" are in reality cases of latent tuberculosis. This opinion is shared by some others who have had wide experience in dealing with children. For the reason just stated, if for no other, cases of malnutrition should receive prompt and careful attention.

Not nearly so many instances of malnutrition as we imagine are really caused by insufficient food. If this were the fact fewer such cases would be observed among the children of the well-to-do. Malnourished children always greatly improve by treatment in open-air schools where feeding, fresh air, and rest are skillfully combined. An attempt should always be made to discover the nature of home conditions in these cases, for in some instances tuberculosis will be found present in one or more members of the family.

One ought to suspect the possibility of tuberculosis in children who show some or all of the following signs:—

- Delicate constitution.
- Tendency to tire out easily.
- Pallor.
- Flushed face at certain periods.
- Capricious appetite.
- Enlarged cervical (neck) glands.

Adenoids.

Diseased tonsils.

No delicate child should be neglected. The time to control tuberculosis is at the beginning, when the disease may be indicated only by some such general signs as those just mentioned.

The teacher's health must receive attention, particularly in respect to tuberculosis. One tuberculous teacher of careless or uncleanly habits has opportunity to infect the 40 or 50 children in her classroom, and through them to send infection into as many homes, exposing in the end 200 or 300 individuals to the chance of infection. As stated by Dr. Langley Porter, "when we consider the contact of child with child, a contact maintained for hours daily, often in an ill-ventilated room, we realize that the danger here is very real. A proper school inspection will mean the elimination of the actually tuberculous pupil and teacher from contact with healthy pupils and instructors."

Prevention. To summarize the means of preventing tuberculosis in school children we may mention the following essential points: —

- (1) Elimination of the tuberculous teacher.
- (2) Segregation of the tuberculous school child.
- (3) Building up the health of all anæmic, nervous, and weak school children.
- (4) Short school day for young children.
- (5) Well-ventilated schoolrooms.
- (6) Sanitary schoolrooms.
- (7) Open-air schools.
- (8) Low temperature schools (temperature not to exceed 60° to 68° F.).

- (9) Common-sense physical training, out of doors.
- (10) More careful health observation on the part of teachers.
- (11) Systematic health inspection of schools.
- (12) Home visits by nurses.
- (13) Knowledge of the nature of the food which school children receive.
- (14) Common-sense, applicable, hygiene instruction.

9. HOOKWORM DISEASE

Hookworm is not often seen in the school children of this country, except in the Southern States. The disease is also common among the Japanese, Hindus, Porto Ricans, and in some of the countries of southern Europe. In the tropics the disease is said to be "the greatest enemy of the human race." In the United States hookworm has been found common from Virginia to Florida and Texas. In a few other States it has been observed rather infrequently. It is estimated that at least 2,000,000 people of our Southern States are infected.

Mode of transmission. The commonest cause of infection among school children is the habit of going barefooted. The disease commonly gains entrance in one of two ways — first and most commonly, through the skin; second, and less frequently, through the mouth. Dock¹ states that the reproductive stage is reached only in the intestinal canal; that the species infecting man does not infect other animals; that the eggs do not hatch in the intestinal canal; and that the larvæ are not infectious until they are at least four or five days old. The real source of infection is, therefore,

¹ Dock and Bass, *Hookworm Disease*.

found in the body wastes of individuals who are infected with the disease.

The usual sequence of infection is as follows: The eggs from the worms in the human intestines reach the soil with the fæces, often as many as 1,700,000 eggs being passed in a single stool; the eggs hatch into larvæ in the soil; the larvæ pass through the skin (commonly through the feet) and reach the intestines; in the intestines the larvæ develop into adult worms; the adult worms produce eggs, which in their turn are passed out of the body with the fæces.

The general effect of the disease, when it is severe, is to produce an extreme degree of anæmia, with consequent loss of energy and mental alertness. In children growth is interfered with, so that a young man of 20 years who has been infected since childhood is often no more developed than a boy of 12 or 13 years. In many of these cases of delayed development X-ray pictures of the hands show the same slow development of wrist bones and the ends of the long bones of the arm as that found in cases of retarded development due to other causes.

Prevention. The all-important matter in hookworm disease is prevention. This is best carried out by the following procedures, as given by Dock: —

(1) Stopping the danger of infection by exterminating the mature worms in the bodies of human beings, in order to check the supply of eggs at the source.

(2) Preventing the growth or existence of larvæ in the places where they develop.

(3) Preventing infection by larvæ that have developed notwithstanding the efforts mentioned under (1) and (2).

Fortunately it has been found an easy matter to cure this disease, and, after a preliminary treatment with "salts," a few doses of thymol usually completes the cure.

10. POLIOMYELITIS (INFANTILE PARALYSIS)

Little need be said in this book about this disease of childhood, for two reasons: first, it will rarely or never be identified at school; second, it fortunately affects children of school age less frequently than infants.

Mode of transmission. Evidence is now available which indicates that the disease may be spread by the stable-fly. On the other hand, some investigations throw considerable doubt on this point. At any rate, the fly is a menace to health, whether of the stable or domestic variety, and should be eliminated from civilized communities. The secretions of the nose and mouth of infected children carry the disease, a fact to which attention has been directed in respect to most contagious diseases of children.

Control. There is a division of opinion as to whether schools should be closed during an epidemic of infantile paralysis. Many modern hygienists claim that such a procedure is quite unnecessary and useless, while some others insist upon the prompt closing of the schools. In any event, absolute isolation is necessary. We know rather less about this disease than any other from which

children suffer, and it remains to-day one of the mysteries which medical science is attempting to solve, but one which, like most other disease mysteries, will no doubt soon yield to painstaking scientific investigation.

11. EPIDEMIC MENINGITIS

As epidemics of meningitis have occurred rather frequently in this country, teachers, nurses, and others who deal with school children ought to have some knowledge of it. It has been recognized in the United States since 1805, and at various periods since that time there have been many definite epidemics of the disease.

According to Osler, epidemic meningitis is most prevalent in winter and spring. The disease is primarily one of childhood, but young adults are sometimes affected.

Contagion. While epidemic meningitis is distinctly transmissible, it does not spread in the same manner as does scarlet fever or measles, but more after the manner of pneumonia. In general it may be said that it is chiefly communicated through the secretions of the nose, mouth, and eyes. The organism causing the disease has been known since 1887.

Symptoms. The attack in the majority of cases is sudden. Sometimes there is abrupt severe headache, with fever, vomiting, and a fast pulse, followed by rigidity of the neck and unconsciousness. Very acute attacks often begin with sudden dizziness, followed by

vomiting and headache, after which fever occurs, and even delirium.

While there is great variety in the mode of onset, it may be said that in the main the characteristic points are: —

Suddenness of attack.
Headache.
Dizziness.
Vomiting.
Fever.
Unconsciousness.
Rapid pulse.
Retraction of the head.
Oscillation of the eyes.
Sometimes an eruption.

Complications. Infection of the ear is very common, and deafness often follows. Inflammation of various joints (arthritis) is common. Accumulation of fluid in the ventricles of the brain (hydrocephaly) sometimes results, causing permanent feeble-mindedness.

Treatment. Flexner's serum is the only form of treatment for epidemic meningitis which offers much hope. Every case of this disease should be diagnosed early and given the Flexner treatment.

12. CONTAGIOUS EYE DISEASES ¹

Attention has been called to the fact that children of school age are especially susceptible to general contagious diseases. This is also true of diseases affecting the

¹ In the preparation of this section the authors are indebted to Whitaker and Ray-Wiggin Company for permission to use certain material from Dr. Hoag's *The Health Index of Children*.

eyes. The early recognition of these eye troubles is of very great importance, not only to the child afflicted, but also to his intimate associates.

As a rule, a teacher is justified in excluding any child, or at least in insisting upon a certificate from a physician, whenever such child is found with evidence of discharging eyes, gluing of the eyelids, or reddening of their inner surfaces, accompanied with any marked sensitiveness to light. To assist the teacher, parent, or any one else who has not had the medical experience, to distinguish the different contagious diseases of the eye, the following brief description of their essential characteristics may prove useful.

(a) *Pink-eye (acute catarrhal conjunctivitis)*

This disease is of frequent occurrence among children, and spreads in a school rapidly. It is commonly carried by means of the common wash-basin, or towel, borrowed handkerchiefs, and the like. The child complains of smarting eyes, sensitiveness to light, and a sensation as though sand were in the eyes. The eyelids stick together at night, and there is often some visible discharge in the corners of the eyes between the lids. The small blood vessels in the white part of the eyes (sclera) and of the lining of the lids (conjunctiva) are very prominent. This results in very noticeable reddening of the eyes.

The disorder usually lasts from ten to fourteen days, but it may persist a much longer time. The trouble is easily cured if it is attended to at once.

(b) Gonorrhæal conjunctivitis

This serious disease of the eyes is often found in newborn children, but it may also occur in children of any age or in adults. It is caused by the germ of gonorrhœa. Indications of this disease are: —

Intense inflammation of the eyelids.
Profuse, thick, purulent discharge.
Lids red and swollen.
Usually intense pain.
Marked aversion to light.
Profuse flow of tears.

This form of eye disease is most serious in its consequences, often causing blindness. It is highly contagious. For these reasons it ought to be recognized early, and receive immediate and skillful treatment. Fortunately, it is not extremely frequent among school children. The disease usually lasts from four to six weeks, but sometimes very much longer. The child must be kept carefully away from other children, and every precaution used to prevent contagion by means of towels, handkerchiefs, wash-basins, the fingers, etc.

(c) Diphtheritic conjunctivitis

This disease is due to the same germ as that which produces diphtheria in the throat or nose. It is very dangerous, but rather infrequent. Contagion is very easy, and therefore its early recognition is of the utmost importance. The essential characteristics of this disease are: —

Severe pain in the eyes.

Eyelids tense and dark-colored.

Discharge at first thin and scanty, later thick and purulent.

A thick, tenacious, grayish membrane forms upon the inner surface of the eyelids which is very difficult to remove.

The disease demands the same treatment as diphtheria of the throat, and the periods of exclusion and quarantine are of great importance.

(d) *Trachoma*

This is one of the most serious of all diseases of the eyes, being highly destructive and extremely likely to produce blindness. Trachoma is prevalent in certain foreign countries, especially in the Orient. In California trachoma is most frequently found among Indians and Mexicans, sometimes, also, among the Japanese. It is extremely common among the Indians of Minnesota. In the large cities of the East and Middle West the disease often occurs among the children of other nationalities, largely in the slums or poorer districts. As many as 17,000 cases have been discovered in the New York schools in one year.

Children suffering from the disease must be immediately isolated, and kept so until recovery is complete. The principal characteristics of trachoma are: —

Inflammation. This is not very intense, but there is considerable swelling of the lids, an aversion to light, and flowing of tears.

The outer surface of the eyeball becomes roughened.

The inner surface of the eyelids becomes covered with

small granules, not unlike boiled sago grains in appearance, and this produces what is called granular eyelids.

The disease is extremely contagious through the discharge from the eyes. Towels, basins, handkerchiefs, etc., are the chief means of conveyance, but uncleanly habits, unhygienic surroundings, poor food, poverty, and the like, favor its development and spread. Strict quarantine against this malady must be established, and continued until all signs of discharge have ceased. *Laboratory examinations should be made in all cases of suspected trachoma.*

Conclusions

- (1) All contagious eye diseases need to be recognized early.
- (2) Removal from school of children with such diseases is necessary.
- (3) Great care must be exercised to prevent contagion through —

The common towel;

The common basin;

Handkerchiefs;

Dirty fingers;

Bedclothing;

Public bathing-suits, and, possibly, swimming-tanks.

13. CONTAGIOUS DISEASES OF THE SKIN¹(a) *Scabies (the itch)*

A contagious skin disease, due to an animal parasite which burrows in the skin, causing intense itching and scratching. The disease usually begins upon the hands and arms, spreading over the whole body, but does not affect the face and scalp. Between the fingers, on the front of the wrist, at the bend of the elbows and near the arm-pits are favorite locations for the disease; but in persons of cleanly habits the disease may not show at all upon the hands, and its real nature is determined only after a most thorough and careful examination. There is great variation in the extent and severity of this disease, lack of personal care and cleanliness always favoring its development. Scratching soon brings about an infection of the skin with some of the pus-producing germs, and the disease is then accompanied by impetigo, a pus infection of the skin.

Itch is very common, and, because of the great variation in its severity, mild cases are often mistaken for hives, eczema, etc. All children who are scratching or have an irritation upon the skin should be examined for scabies.

It is very important that all infected members of a family be treated till cured, else the disease is passed back and forth from one to another. It is also impor-

¹ With acknowledgments to a pamphlet on Medical Inspection by the Massachusetts Board of Education, and one by the Cincinnati City Board of Health, called *Suggestions to Teachers*.

tant that all underclothing, bedding, towels, and other things that come in contact with the body, be boiled when washed. All cases of scabies should be excluded from school until cured.

(b) *Pediculi capitis* (head lice)

An extremely common accident among children, either from wearing each others' hats and caps, or hanging them on each others' pegs, or from combs and brushes. No person should be blamed for *having* lice — only for *keeping* them.

The irritation caused by vermin in the scalp leads to scratching, which in turn causes an inflammation of the skin of the neck and scalp. The skin then easily becomes infected with some of the pus-producing germs, and large or small scabs and crusts are formed with the dried matter and blood. Along with this condition the glands back of the ears and in the neck become swollen, and may be very painful and tender.

The condition of pediculosis is most easily detected by looking for the eggs (nits), which are fastened to the hair and are not readily brushed off. The condition is best treated by killing the living parasites with crude petroleum, and then getting rid of the nits. With boys, this is easy — a close hair-cut is all that is needed; with girls, by using a fine-toothed comb wet in alcohol or vinegar, which dissolves the attachment of the eggs to the hair. All combs and brushes must be carefully cleansed.

The best way to eradicate lice from a school is to

have the school nurses give the necessary treatments. This can be done at school, without any exclusions. If there are no school nurses, then children with pediculosis should be excluded from school until the heads are clean. In Massachusetts, parents who neglect or refuse to care for their children in this respect may be prosecuted under the compulsory attendance law.

(c) *Ringworm*

A parasitic disease of the skin and scalp. When it occurs upon the skin it yields readily to treatment; but upon the scalp it is extremely chronic. Ringworm of the skin usually appears on the face, hands, or arms — rarely upon the body — in rings of varying size. One or more, usually not widely separated, may be present at the same time. All ringed eruptions upon the skin should be examined for ringworm.

When the disease attacks the scalp, the hairs fall or break off near the scalp, leaving dime-to-dollar-sized areas, nearly bald. The scalp in these areas is usually dry and somewhat scaly, but may be swollen and crusted. The disease spreads at the circumference of the area and new areas arise from scratching, etc.

Another disease, somewhat like ringworm of the scalp, is known as “favus” — a disease much more common in Europe than America. In this disease quite abundant crusts of a yellowish color are present where the process is active. The roots of the hairs are killed, so that the loss of the hair from this disease

is permanent, a scar remaining when the condition is cured.

Care must be taken to see that all combs and brushes are thoroughly cleansed, and to prevent children wearing each others' hats, caps, etc. Children with ringworm of the skin may be treated at school by school nurses. Ringworm of the scalp was formerly dealt with by exclusion, or by segregation of the children in special classes. By the earlier tedious methods of treatment attendance at the "ringworm class" was sometimes necessary for many months, or even years. The new X-ray method is so much more expeditious that where this method is used the disease no longer presents any serious problem.

(d) *Impetigo*

A disease characterized by a few or many, large or small, flat or elevated, pustules or festers upon the skin. The condition is often secondary to irritation or itching diseases of the skin (hives, lice, itch), and scratching starts up a pus infection.

The disease most often appears upon the face, neck, and hands; less often upon the body and scalp. The size of the spots varies very much, and they often run together to form on the face large superficial sores, covered with thick, dirty, yellowish, or brown crusts. The disease is contagious, and often spread by towels and things handled. Children having impetigo should not be allowed to attend school until all sores are healed and the skin is smooth.

GENERAL SUMMARY

Any of the following points ought to suggest the possibility of some form of transmissible disease in children: —

Flushed face.

Lassitude.

Vomiting.

Eruption.

Red eyes.

Watery eyes.

Nasal discharge.

Persistent cough.

Scratching.

Sore throat.

Aches and pains.

Headache.

Fever.

Loss of appetite.

Disease	Principal early signs and symptoms	Method of Infection
Measles	<p>Begins like cold in the head, with feverishness, running nose, inflamed and watery eyes, and sneezing; small crescented groups of mulberry-tinted spots appear about the third day; rash seen first on forehead and face. The rash varies with heat; may almost disappear if the air is cold, and come out again with warmth.</p>	<p>Forced exhalation and discharges from nose and mouth.</p>
German measles	<p>Illness usually slight. Onset sudden. Rash often first thing noticed; no cold in head. Usually have feverishness and sore throat, and the eyes may be inflamed. Rash something between measles and scarlet fever; variable.</p>	<p>Forced exhalation and discharges from nose and mouth.</p>
Chickenpox	<p>Sometimes begins with feverishness, but is usually very mild and without sign of fever. Rash appears on second day as small pimples, which in about a day become filled with clear fluid. This fluid then becomes matter, the spot dries up, and the crust falls off. May have successive crops of rash until tenth day.</p>	<p>Forced exhalation and crusts on the spots.</p>
Scarlet fever or scarlatina	<p>The onset is usually sudden, with headache, languor, feverishness, sore throat, and often the child is sick at the stomach. Usually within twenty-four hours the rash appears, and is finely spotted, evenly diffused, and bright red. The rash is seen first on the neck and upper part of the chest, and lasts three to ten days, when it fades and the skin peels in scales, flakes, or even large pieces. The tongue becomes whitish, with bright red spots. The eyes are not watery or congested.</p>	<p>Forced exhalation, and discharges from nose and mouth, particles of skin, and discharges from suppurating glands or ears. Milk especially apt to convey infection.</p>

Remarks	Period of exclusion recommended
<p>After effects often severe. Period of greatest risk of infection, first three or four days, before the rash appears. May have repeated attacks. Great variation in type of disease. Often fatal.</p>	<p>Four to five weeks.</p>
<p>After effects slight.</p>	<p>Three weeks.</p>
<p>When children return, examine head for overlooked spots. All spots should have disappeared before child returns. A mild disease and seldom any after effects.</p>	<p>Till all scabs have disappeared.</p>
<p>Dangerous both during attack and from after effects. Great variation in type of disease. Slight attacks as infectious as severe ones. Many mild cases not diagnosed and many concealed. The peeling may last six to eight weeks. A second attack is rare. When scarlet fever is occurring in a school, all cases of sore throat should be sent home.</p>	<p>Six to eight weeks, or until desquamation has ceased.</p>

¹ With acknowledgments to *The Health Index of Children* (Hoag).

Disease	Principal early signs and symptoms	Method of infection
Diphtheria	Onset insidious; may be rapid or gradual. Typically sore throat, great weakness, and swelling of glands in the neck, about the angle of the jaw. The back of the throat, tonsils, or palate may show patches like pieces of yellowish-white kid. The most pronounced symptom is great debility and lassitude, and there may be little else noticeable. There may be hardly any symptoms at all.	Forced exhalation and discharges from nose, mouth, and ears.
Whooping-cough	Begins like cold in the head, with bronchitis and sore throat, and is a cough which is worse at night. Symptoms may at first be very mild. Characteristic "whooping" cough develops in about a fortnight, and the spasm of coughing often ends with vomiting.	Forced exhalation and discharges from nose and mouth.
Mumps	Onset may be sudden, beginning with sickness and fever and pain about the angle of the jaw. The glands become swollen and tender, and the jaws stiff, and the saliva sticky.	Forced exhalation and discharges from the nose and mouth.
Influenza	Begins with feverishness, pain in head, back, and limbs, and usually cold in the head.	Forced exhalation and discharges from the nose and mouth.
Smallpox	Illness is usually well marked and the onset rather sudden, with feverishness, severe backache, and sickness. About third day a red rash of shot-like pimples, felt below the skin and seen first about the face and wrists. Spots develop in two days, then form little blisters, and in another two days become yellowish and filled with matter. Scabs then form, and these fall off about the fourteenth day.	Forced exhalation; all discharges, and particles of skin or scabs.

Remarks	Period of exclusion recommended
<p>Very dangerous both during attack and from after effects. When diphtheria is occurring in a school, all children suffering from sore throat should be excluded. There is great variation of type, and mild cases are often not recognized, but are as infectious as severe cases. There is no immunity from further attacks. Membrane may occur in nose only.</p>	<p>Six weeks, or until all diphtheritic germs have disappeared from cultures taken from throat.</p>
<p>After effects often very severe, and the disease causes great debility. Relapses are apt to occur. Second attacks rare. Specially infectious for first week or two. If a child is sick after a bout of coughing, it is most probably suffering from whooping-cough. Great variation in type of disease.</p>	<p>Two months, or until cough and vomiting cease.</p>
<p>Seldom leaves after effects. Very infectious.</p>	<p>About a month.</p>
<p>Excessively infectious. After effects often very serious and accompanied with prostration and nervous disability.</p>	<p>About three weeks.</p>
<p>Is peculiarly infectious. When smallpox occurs in connection with a school or with any of the children's homes, an endeavor should be made to have all persons over seven years of age vaccinated. Cases of modified smallpox — in vaccinated persons — may be, and often are, so slight as to escape detection. Fact of existence of disease may be concealed. Mild or modified smallpox as infectious as severe type.</p>	<p>Till all scabs have disappeared.</p>

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CHAPTER XII

OPEN-AIR SCHOOLS

Recent spread

THE phenomenal spread of open-air schools during the last few years constitutes one of the most significant developments in modern education.¹ The first open-air recovery school was that of Charlottenburg, Germany, in 1904. England's first school of this type was opened in 1907; America's first, in 1908. Since then, open-air schools for tuberculous or pre-tuberculous children have been established in nearly all of the large cities of every country. There were open-air schools in forty-four cities of the United States in 1912. No city which has undertaken the work has subsequently abandoned it.

The school department of Boston has adopted the plan of building one or more open-air classrooms in each new school building to be erected. About 5 per cent of Boston's school population will attend these classes. In some of the cities and countries of California a majority of the school buildings now being erected are constructed on a plan which permits all the rooms to be converted in a moment into open-air rooms. This is done by means of hinged windows,

¹ For a comprehensive and interesting account of this entire movement, including data regarding management, cost, etc., the reader is referred to the admirable booklet by Leonard P. Ayres.

which reach from floor to ceiling, and which occupy practically all of the space of one or more of the walls.

The open-air school has been conducted in the main for the benefit of tuberculous or pre-tuberculous children. Here such children are watched over by school nurses or medical attendants, fed from one to five meals of nourishing food per day, and given a daily program which resembles very little the study program of the ordinary school. The book work is usually reduced to two or three hours per day and the remainder of the time is devoted to manual work, play, meals, rest, and sleep.

Program

The following program of the Bradford (England) open-air school is typical: —

9 A.M.	Breakfast.
9.45 to 10.45	Ordinary school work.
10.45 to 11	Play.
11 to 12	Ordinary school work.
12.30 to 1	Dinner.
1 to 2 P.M.	Rest and sleep.
2 to 3	Play.
3 to 4.30	Outdoor lessons (nature study, geography, etc.).
5	Tea.
5.30 to 6	Play.

In some of the open-air schools of Germany as many as five meals are served per day; in the United States, more often from one to three. In some cases the amount of time devoted to instruction is less than that at Bradford, and the period for sleep proportionately longer.

Results

Tuberculous children who attend open-air classes seldom fail to show immediate and rapid improvement in weight, appetite, blood-count, mental alertness, and freedom from colds. At the Bostall Wood School (London), children gained on the average six and a

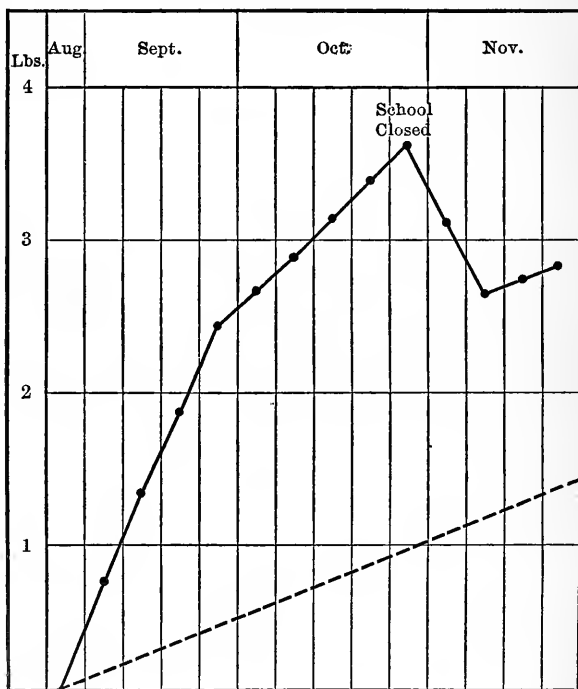


FIG. 6

Showing the average weekly gain or loss in weight of children attending the Bradford Open-Air School in 1908. The dotted line shows the average increase which takes place in the case of children under ordinary conditions.



Mid-winter sun-baths at Leysin Hospital for children with tuberculosis of the bone.



Pivot windows. Open-Air School. George Bancroft Building, Minneapolis.

OPEN-AIR SCHOOLS

half pounds during the thirteen weeks the school was in session. The Charlottenburg school brought a similar increase in weight. In the first open-air school of Chicago the average gain per child was three and three quarter pounds during the first month. These gains are all much in excess of the normal.

As a rule, the rapid gain in weight continues only so long as the school is in session. When vacation comes, and the child is thrown back upon the resources and regimen of the home, his progress toward recovery is checked or thwarted altogether. In the school year 1910-11, the children of Open-Air School Number 21, New York City, lost during the Thanksgiving, Christmas, and Easter vacations an average of 1.72 pounds per child. This was 49 per cent of the average gain per child during the entire year. In one of the Cleveland open-air schools (1910-11) the pupils made an average gain in weight of more than four and a half pounds between December 12 and January 9, while the pupils of a similar school, in the same city, required to be indoors during the same period on account of building repairs, suffered an average loss of one and a half pounds, notwithstanding the continuance of special feeding.

The improvement in the condition of the blood is also very marked. Children who are placed in open-air classes are usually found to have a hæmoglobin content of about 70 per cent. Sometimes it is as low as 50 or 60 per cent. Under the combined influence of outdoor instruction, feeding, decreased book-work,

and increase of rest and play, the hæmoglobin seldom fails to mount rapidly to 80 or 85 per cent. This is within 5 or 10 per cent of normal for children of school age. At Bradford the average increase of hæmoglobin during nine weeks was 10 per cent. For Open-Air School Number 21, New York City, the average gain per child from October to May was 13.75 per cent.

Hæmoglobin records, like those of weight, demonstrate the superiority of the open-air school over the average city home. This is clearly revealed in figure 7.

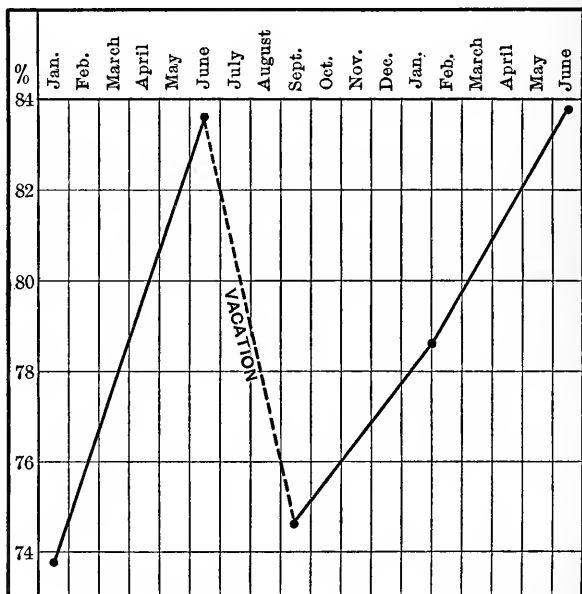


FIG. 7

Hæmoglobin tests, Providence Open-Air School, 1908-1909. Average for class. Note falling off during vacation.

Except for vacation disturbances, therefore, the hæmoglobin improves under the open-air regimen throughout the school year. The gain is usually very rapid at first, then becomes somewhat slower as the normal condition is approached.

It is interesting to compare with this the hæmoglobin curve of normal children in the ordinary indoor class. Such a comparison was made in New York City, in 1910-11, between 27 normal children of the regular

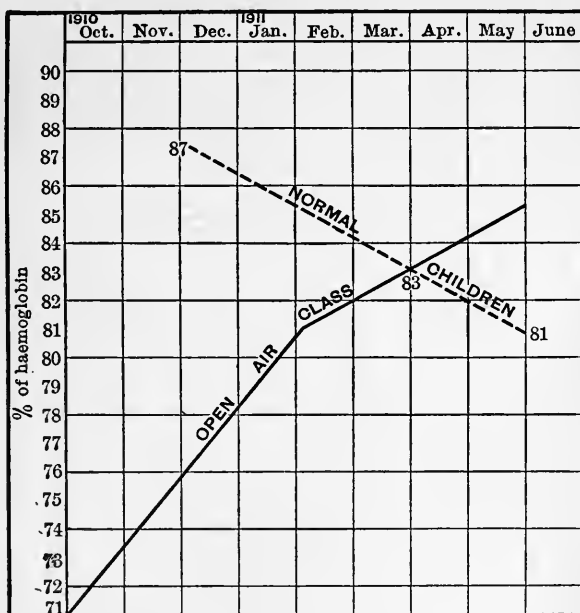


FIG. 8

Curves showing changes in hæmoglobin during school year in anæmic children of Open-Air School No. 21, New York, and in normal children chosen from an ordinary class.

class and the 21 sickly children of Open-Air School Number 21. The blood of normal children in the ordinary class was found to deteriorate gradually during the school year, while that of the open-air children significantly improved.

In a seaside hospital in Germany, conducted as a six-weeks' summer-vacation colony for tuberculous children, Haberlin ¹ has for several years made blood tests of children on arrival and on departure. The average gain of 81 pupils, 4 to 14 years of age, was 452,000 red corpuscles per cubic millimeter of blood. The average gain in white corpuscles was 2000. Hæmoglobin tests for 362 children gave an average increase of about 8 per cent. Twenty-eight children who were studied separately had an average hæmoglobin content of 79 per cent on arrival in June, 92 per cent on their departure after six weeks, 86 per cent the following December, and 84 per cent in February. Nineteen of the children were followed for two years. When these first entered the colony the hæmoglobin averaged 75 per cent. In six weeks it rose to 88 per cent, and was 85 per cent when the pupils returned to the colony the following summer. This is important as showing that much of the good accomplished is a permanent gain.

Haberlin found for 913 such children an average gain in chest circumference of 1.6 centimeters during the six weeks, and an average increase of 7.5 kilograms in strength of grip. The gain in weight was several

¹ See reference 10 at end of this chapter.

times the normal, and in the case of 74 per cent of the children was permanent. Many of these children, says Haberlin, are from good homes. Notwithstanding this, they are barely able, after their return home, to retain the advantage gained in the six weeks' summer colony. No further gain is made. But the same children, on their return to the colony the following summer, immediately begin to gain at several times the normal rate.

Appetite and sleep improve correspondingly. When Open-Air School Number 21 of New York began work in September, 1910, no child ate more than his regular allotment of food, and 20 per cent did not eat all that was served them. Within eight weeks all were eating their entire allotment, and 25 per cent of them were given a second helping. Sleep, which averaged for the first month only 12 minutes during the daily rest-hour, increased to 41 minutes by the end of the year.

After a few months in the open-air school a large proportion of tuberculous children (usually from one third to one half) present the appearance of complete recovery, while most of the remainder show distinct improvement. Neither improvement nor apparent cure, however, justifies the return of the child to the indoor class. Relapse may occur. The mere fact that a tubercular tendency exists gives such a child an undeniable right to that type of school which will accomplish most to strengthen his physical defenses.

Pedagogical results

The mental results of the open-air school are hardly less important than the physical. Children who are listless, apathetic, and retarded may become interested and attentive. Nervous children develop habits of self-control. Incurrigible children become docile and helpful. The spirit of the open-air school is "different." Freedom, initiative, and social coöperation replace the artificiality and routine of the usual school. Open-air schools tend to inculcate open-air morals.

One of the best lessons of all relates to pedagogical economy. The open-air school has demonstrated that it is possible for sickly children to make as satisfactory school progress on a study program of three hours per day as healthy children ordinarily make on a five-hour program. In the New York school already referred to, 48 per cent of the pupils advanced at more than the normal rate. Grades in the open-air classes usually average better than in others. Attendance is nearly always more regular. It is not necessary for the child to become retarded while recovering from tuberculosis.

The instruction, itself, in open-air classes has noteworthy advantages. The child is brought into closer relation with the world of animate and inanimate things around him, and is more likely to associate the knowledge gained in class with his own experiences. Arithmetic, for instance, is taught in the Charlottenburg school by measuring objects, counting trees, calculating spaces, etc. In the geography classes re-



AN OPEN-AIR CLASS IN MID-WINTER, CHICAGO

From Kingsley's "Open-Air Crusaders," by permission of United Charities of Chicago.



The monthly examination by the physician in charge.



Complete relaxation on the cots.

CHICAGO OPEN-AIR CLASSES

From Kingsley's "Open-Air Crusaders," by permission of United Charities of Chicago.

lief maps are constructed in the sand showing the configuration of the surrounding country. The action of running water, the formation of deltas, the causes of floods, the modes of irrigation, etc., are all made clear by objective instruction. The habits of plants and animals, fundamental facts relating to the decomposition of rocks, soil formation, weather conditions, etc., are easily imparted and made intimate possessions of the child's mind.

Open-air schools have so fully proved their superiority as to warrant their extension to include a considerable proportion of the school population. At least ten or fifteen per cent should be looked upon as definitely predisposed to tuberculosis. Nor is there any valid argument for limiting the advantages of open-air schools to children who are sickly. Schools which accomplish so much for the latter could not fail to be of benefit to normal children. It is foolish to deny a healthful environment to all except those whose health is already impaired.

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CHAPTER XIII

SCHOOL HOUSEKEEPING

School dust and its dangers

SCHOOLROOMS have too long been prisons for the incarceration of children and dust. Until recently, a school without its eternal cloud of dust was as inconceivable as a school without children. However, with the advance of physiological and bacteriological science our ideals are undergoing a rapid change, and the modern canons of school hygiene are ever becoming more strict in regard to methods of insuring cleanliness.

School cleanliness means chiefly the avoidance of dust. To carry on a constant warfare against this enemy of children we employ janitor service amounting to the full time of 30,000 or 40,000 men and women. Their monthly wages amount to more than the wages paid to our standing army. The enemy they fight is infinitely more menacing to our national welfare than the military forces of other nations. Directly and indirectly, dust probably causes greater destruction of life in the United States every year than was accomplished by battle in any year of our Civil War. All nations employ naval and military experts at liberal salaries to study scientifically the means of defense and destruction in order that the forces of war may

be managed effectively. But nations do not employ dust experts. Few people know what constitutes efficient janitor service, or care enough about it to find out. Would not a national training school for janitors contribute more to humanity than do military and naval academies?

Dust is of two kinds, organic and inorganic. Dust of some kind is omnipresent. On lofty mountain-tops or over the sea the number of dust particles per cubic centimeter of air may be as low as 150 or 200. In a garden near the center of Paris the number was 160,000 per cubic centimeter. The air in a room where the Royal Scientific Society of Edinburgh met was found to contain 275,000 particles per cubic centimeter before the meeting and 400,000 after an hour and a half. Near the ceiling there were 3,000,000 particles per cubic centimeter.

But not all dust is injurious. If not metallic or gritty, inorganic dust particles may be breathed in great numbers without injury. Apart from germ-bearing particles, it is the gritty mineral dust that is most to be feared. Mineral dust produces its injury in two ways: (1) Numerous small particles lodge in the lungs and excite by their presence the formation around them of a fibrous tissue which replaces the true lung tissue; and (2) they produce lacerations of the throat and lungs which serve as lodging-places for disease germs, especially the tubercle bacilli. Laborers who grind pottery, and inhale thousands of sharp-edge dust particles with every breath, die with

six times the normal frequency from tuberculosis. For the same reason, glass-workers and stone-cutters have a mortality from tuberculosis several times the normal.

Mineral dust is abundant in all but the best-kept schoolrooms. It is (1) blown in by the dust-laden air from streets or roads; (2) carried in on the shoes of children as dirt and gravel, later to be ground and pulverized on the floor; and (3) manufactured in large quantities by the inordinate use of chalk and blackboards. Dust from all these sources is so dangerous that relentless warfare should be waged against it.

Organic dust is dangerous principally as a germ-carrier, although air-borne germs do not play as great a rôle in causing infectious diseases as they were formerly thought to play. Nevertheless infections sometimes occur in this way, and hygiene demands that we should keep the number of organic dust particles as low as possible.

The amount of germ-carrying dust in a room is tested by exposing to the air, for a given time, a gelatin plate of standard size and material, which catches the floating germs and acts as a culture medium for the development of bacterial colonies. The plate is then examined microscopically, and the number of bacterial colonies counted.

The number collected on a plate is found to vary from none in purest mountain air to many hundreds in the worst ventilated dwellings, shops, and schools. In a children's drawing-room the number in a short

time was multiplied eight times by the dancing of twenty children. In railway coaches, bedrooms, schools, etc., the number increases rapidly the more persons there are crowded together, the more actively they move about, and the smaller the intake of pure air.

The investigations of Carnelly, Haldane, and Anderson show that the number of germs carried by school-room air averages about ten times as great in the worst ventilated as in the best ventilated schools. Children are often exposed for six hours a day to an atmosphere which is five times as thick with germs as the ordinary bedroom in a middle-class home. It was found that the number of bacteria per liter of air in a Dundee high school could be raised from 10 to 150, by having the pupils stamp on the floor. The number is always enormously increased by calisthenic exercises in the room, by the movements of children at recess, and by dry sweeping. Even a well-ventilated schoolroom, if dirty, has been found to contain more bacterial colonies than a one-room city dwelling, kept clean.

Prevention of dust by means of floor oils

Many experimental tests have demonstrated that floor oils are extremely effective, if applied correctly and often enough. The floor should first be cleaned thoroughly, the oil should be spread thin, and after drying the unabsorbed oil should be mopped up. Treatment should be given at least three days before

the room is to be used, and should be repeated at least two or three times yearly.

The following table from Dr. Lambert,¹ which is a fair sample of numerous experiments of this kind, illustrates very well the effect of floor oil on the number of germs in schoolroom air: —

TABLE VI

Plates exposed	Colonies of bacteria	
	Floors treated with oil	Floors not treated
5 minutes in still air.....	0	7
30 minutes in still air.....	2	12
5 minutes during sweeping.....	38	456
5 minutes just after sweeping.....	11	79
5 minutes beginning 10 minutes after sweeping	6	62
5 minutes beginning 15 minutes after sweeping	1	31

Dr. Butler's tests (quoted by Lambert) show that the bacteria are no more numerous over an oiled floor after four weeks than over an untreated floor two days after scrubbing. In fact, the oil is very effective for twelve to fifteen weeks after its application. Other tests have shown that an old, worn floor is more hygienic when oiled than a new and well-laid floor untreated. Oker-Blom has demonstrated that if a floor is properly treated with oil the amount of dust in the air after sweeping is less than is the case after the children have been permitted to run twice around the room in physical exercises.²

¹ See reference 10 at the end of this chapter.

² See reference 12 at the end of this chapter.

Against the use of oil it has been argued that it darkens the floors, makes them slippery, and causes the soiling of girls' dresses. These arguments have little weight. The darkening can be partly prevented by properly cleaning the floors before the oil is applied, and by wiping them every week with wet cloths. The floors will not be made slippery if the excess of oil is removed, nor will they, after the first few days, spot the dress very considerably. With the shorter dresses now worn, the skirt and the floor seldom come in contact. Pupils should be taught, anyway, that it is better and cleaner to have a little dirt on the dress than to mix it with the food which is given to the lungs.

Method of cleaning

The number of dust particles and germs also depends on the method of dirt removal. The least effective method is that of sweeping the dry floor with the old-fashioned straw broom. Only the coarse dirt, which, of course, is harmless because it could not reach the lungs, is removed in this way. The fine dirt, the only kind that can injure us, is mixed with the air. The bristle brush far excels the broom as an instrument of cleanliness, and is especially effective when used with dampened sawdust or other materials of like nature. Still better is the oil brush, an ordinary brush furnished with a small tank for kerosene. The kerosene slowly feeds down from the tank upon the bristles, keeping them slightly moist. When the floor is kept

well oiled and brushes of this type are used, the dust practically disappears.

It seems probable, however, that vacuum cleaners are destined to supersede all other methods in the care of schoolhouses, as they have done for office buildings, hotels, apartment houses, etc. Some hundreds of school buildings are already equipped with them, with a resulting noticeable decrease in sickness and improvement of attendance.

Where primitive methods of sweeping are employed, dusting becomes an important feature in the care of the school building. The feather duster and the old-fashioned broom were fit companions in crime. Both have been driven from our city schools, but both continue their nefarious business in the rural districts. They should be outlawed relentlessly. The feather duster moves the dust, but does not remove it. The only way to get rid of the dust which settles on the school furniture is to wipe it up with a damp cloth. No other dusting deserves the name, and any other kind is worse than none at all.

Other ways of preventing dust

We have already seen that floating dust is many times increased by the marching, stamping, and play of children in the room. Calisthenic exercises should be given out of doors, and, except when it cannot be avoided, children should not be permitted to remain indoors at recess time. Open windows let the fresh

air blow in and the dust blow out. The windows should be kept open during all recesses.

As a rule, blackboards are used much more than is necessary. "Dustless" crayons are not quite dustless, but should replace the soft plaster-of-Paris chalks still so generally used. Better than chalk and blackboard is the "muroscroll," a paper surface which rolls in a wooden frame and is used with wax crayon. It is inexpensive, convenient, and while not rendering the blackboard entirely unnecessary, it can replace it for most purposes.

Dust can be further prevented by proper cleanliness of the children in shoes, dress, and body. The schools should be provided with doormats of both the wire and fiber varieties.

Special effort should be made to keep the gymnasium clean. Children breathe more deeply there than in the classroom. Mats and other dust-gathering paraphernalia should be discarded. The windows should be kept open, and cleaning should be thorough and frequent.

If the school building employs mechanical ventilation, care should be exercised to keep the fresh-air supply free from dust. The intake should not be near a street or a dusty playground. In many cases it is necessary to screen the air at the intake by letting it pass through a cloth filter, which is kept damp by the dropping of water upon it.

The basement also deserves special mention, particularly when it is used as a substitute for playgrounds.

The Muroscroll

This device offers a movable paper writing surface which combines the convenience of a common blackboard with all the merits of a permanent chart.

The paper is reeled forth and back by means of the cranks seen at the side.

It is sanitary because dustless. No erasers are required. A thousand feet of paper four feet wide costs but a dollar.

A. G. Grant.

Salab. H. Co.

THE MUROSCROLL

It is almost always poorly ventilated, and is usually filled with fine mineral dust produced by the movement of children over the cement floors. If a real playground is impossible, it is often better to use the halls than the basement for this purpose. Chicago has recently abolished basement play, and other cities are rapidly following the example. The moral argument against the basement playground is as strong as the hygienic.

Standards of cleanliness

The low standard of cleanliness still prevailing in the care of the school is well brought out in an investigation by the Russell Sage Foundation in 1911. By means of a questionnaire sent to our 1200 cities, reports were secured from 758 on this point. The main results are summarized in the table given below. It

TABLE VII

Frequency	Cities reporting		
	Floors washed	Floors swept	Windows washed
Daily.....	1	574	1
Once in 2 days.....	1	49	1
Once in three days.....	3	86	0
Weekly.....	36	6	22
Once in 2 weeks.....	27	2	8
Once in 3 weeks.....	8	0	5
Monthly.....	135	2	117
Once in 2 months.....	50	1	84
Once in 3 months.....	140	0	139
Once in 5 months.....	115	2	111
Once a year.....	57	0	31
As needed.....	68	10	139
Never.....	44	0	5

will be noted that less than one half wash the floors as often as once in three months, and that nearly 10 per cent do not sweep oftener than once in three days. It is very probable that if data could be secured from the cities which failed to answer the questionnaire the figures would be still more shocking.

The school cannot be kept sanitary unless it is thoroughly swept and dusted each school day. The sweeping should always be done with windows open and after the close of the school day. The dusting should be done in the morning, at least half an hour before the pupils assemble. If the floors have not been oil-dressed, damp sawdust or some other preparation should be used in sweeping. Untreated floors should be varnished once a year, and all cracks should be kept filled. In addition, the floors and all the furniture need to be thoroughly washed every few weeks. Windows also should be cleaned several times a year, to keep them more transparent.

Copenhagen requires that the school furniture be washed at least once every fourteen days, the windows eight times a year, and the inside of the desks once a year. The floors must be cleaned daily, and dry sweeping and dry dusting are prohibited. These measures were instituted chiefly for the purpose of combating tuberculosis.

Janitor service should not ordinarily be done by the pupils, but in case this cannot be avoided, only pupils of good physical constitution, and those who come

from families untainted with tuberculosis, should be permitted to do the work.

Professional training for janitors

Efficient housekeeping in the school should be substituted for our present haphazard janitor service. The school should be kept as clean as our best hospitals. Before this can be brought about, janitors will have to be better trained for the work they have to do. Too often janitors have nothing to recommend them except "poverty or political pull." The position of janitor is really a responsible one. No other individual about the school building, unless it be the principal, has so much influence over conditions which affect the health of the pupils.

At present even the better class of janitors usually do this work by rule-of-thumb methods. This is because they have received no instruction as regards the scientific principles which relate to their work. Instead of merely being able to operate a fan, etc., mechanically, the janitor ought to know why fresh air is needed. He should not only be willing to sweep and dust according to rules, but he should appreciate the dangers arising from bad methods of school housekeeping. He should not only be able to run the ventilating and heating apparatus when it is in order; he should also have the mechanical skill to make certain repairs and to locate defects.

Such knowledge and skill do not come of themselves. Professional training courses are needed, along the

lines suggested by references 6, 8, and 13 at the end of this chapter. Courses of this type do not cost much in time or money, and the results are out of all proportion to either. It is vain to expect in janitors a love of cleanliness or a conscientious adherence to the rules laid down for them, if they do not appreciate the dangers of uncleanness and the reasonableness of the rules.¹

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¹ See reference 6 for an ideal set of instructions for the use of janitors.

CHAPTER XIV

THE TEACHING OF HYGIENE: THE FIRST SIX GRADES

Inculcating health habits

THOSE who are interested in the subject of hygiene and sanitation in schools, whether as students, teachers, or principals, ought to possess some definite knowledge of the fundamental ideas underlying the successful presentation of health principles to children. These principles of health are in fact relatively simple, but unfortunately almost no other subject in the public schools is so inadequately taught as hygiene. This condition is to be explained in part by the fact that teachers are themselves ordinarily poorly instructed in the subject; in part by the fact that the subject-matter is not directly applied to the real life of the pupil, and is therefore ineffective.

There is a vast difference between instructing a child about principles pertaining to his health and inducing him to put such principles into action. The teacher's problem is mainly the latter one, and any method of instruction which fails in this respect is a failure altogether.

We hear much about the health supervision of schools, physical education, and the like, but how often are these ideas associated with the proper methods of school sanitation and with efficient instruc-

tion of pupils in matters pertaining to personal health? The truth is that the various health problems in schools have not been sufficiently correlated, and therefore much waste of time and energy have resulted.

The problems of school hygiene will never be solved in a satisfactory manner until the closely related factors entering into them are clearly apprehended and properly associated. Of these factors, that of hygiene teaching is one of the most fundamental. How shall health instruction be made efficient in the different grades, and to pupils of various ages and of different home conditions? It would seem self-evident that the first requirement is that the instruction must be adapted to the pupil's powers of comprehension, but this is the very requirement most often lost sight of. The adaptation of the subject-matter to the intellectual and social development of the child has been strangely, and one might almost say perversely, neglected. Miniaturizing a subject adapted to an adult mind does not necessarily bring it within the range of the child's comprehension.

In the lowest grades, say from the first to the fifth inclusive, little formal instruction is necessary, but health habits must be established at this stage of the child's development. This can be successfully accomplished by regarding such habits as an important part of the child's everyday life at school, and as far as possible in the home. From the time a child enters school, until he is about ten or eleven

years of age, it is a mistake to suppose that he is much influenced by explanations and reasons. His habits of life during this period ought to be largely automatic. Children of this age who learn successfully do so mostly by imitation and constant repetition.

This is the age during which environment exerts its greatest influence, for the young child becomes a part of all that surrounds him. A child's character in most fundamental particulars is usually pretty well established by the time he is seven or eight years of age, if indeed not earlier. It is of the utmost importance, therefore, to place young children in a proper health environment. This must find expression in the schoolroom, in the personal habits of the teacher herself, in the school associates of the child, and in the general conditions of the child's home.

The rather common practice of attempting to instruct very young pupils in such subjects as the effects of narcotics and stimulants, the physiological uses of food, the structure of the body, the functions of organs, the chemistry of the air, the nature of the blood, the growth of bacteria, and the methods by which they are spread, and the like, is so absurd as to seem past belief. Yet these are some of the many topics to be found mentioned in most courses of study for children in the lower grades, and in part required by the laws of the State. The young child's mind never fully grasps such abstract ideas. Information at this period, to be of value, must be concrete, definite, capable of being expressed at once in action, and

stated in terms with which the boy or girl is already perfectly familiar. The child must be instructed *how* to do the right thing in health, rather than *why* to do it, just as the aim of moral education is to train us to do the right thing at the right moment without having to think. The right thing in health will be done by children only when they are so educated that they do not have to think about it.

It is of no possible use to tell small children that dirty finger-nails may harbor disease bacteria, or for us to talk about germs at all. These little pupils may successfully repeat what is said to them about such matters, but such conceptions are never really grasped by the young child. The habit of clean hands and nails at school must be acquired by the child, not primarily because of the possible danger from disease germs on dirty hands, but because clean hands are arbitrarily desirable. And the same may be said of habits pertaining to clothing, shoes, the hair, the teeth, and various other personal matters.

The kind of knowledge which is desirable at this age is that which expresses itself in useful action. It is not essential that young pupils, or most older ones, should learn much about the structure or anatomy of the body; nor is it necessary or desirable for any but relatively mature pupils to understand how the body does its work (its physiology). But even the very youngest children in the schools are not too young to begin to learn some simple but fundamental principles in respect to the care of the body, about some

of the things which interfere with its best action, and how to avoid them. This is true hygiene.

The complete study of the human body is one of the most difficult of all subjects. No piece of machinery, however complicated it may be, can compare with the body in this respect. But without attempting to study any but its most obvious features of structure and action, even very young children can understand enough about this human machine of ours to learn how to take the best care of it. It should be the purpose of hygiene instruction in schools "to help young people, who will be men and women before very long, to know the truth about common living, and to act on such knowledge."

Health instruction in the first five grades

As has already been indicated, no formal methods of instruction need be presented before the sixth grade. Instead, teaching effort ought to be concentrated upon the inculcation of health habits.

One of the easiest and most effective methods for helping the pupil to form health habits at this time is that of "personal inspection." This need never prove embarrassing, either to the pupil or to the parent, and when properly conducted will be regarded, first, as a source of entertainment, and second, as a matter of personal pride, until at last health habits have become an inseparable part of the child's life.

Children are not dirty because they prefer to be so, but because they are not taught the pleasure of cleanli-

ness. Nearly all the rooms of the lower grades in our grammar schools are offensive to the sense of smell, at least to the individual who has not had his olfactory sense perverted through constant abuse of it. This offensive odor is due in large part to dirty, neglected bodies and clothes. The first requirement is, therefore, to inculcate the love of personal neatness and cleanliness. It goes without saying that the teacher herself must embody this principle before she attempts to impart it to her pupils. In some rare cases, however, the lesson will have to begin with the reformation of the personal habits of the teacher.

Personal hygiene inspection by teacher and pupils

The personal inspection of pupils must be adapted to the peculiar needs of individual conditions, but in the main may follow the method outlined below.

The pupils themselves may be easily taught to take part in this inspection by the teacher appointing the one passing the best inspection to act as inspector of the rest of the class, for a given time. The complete inspection need not be introduced at once, but the pupils may be led very gradually into it, so that their interest will be aroused and their fears or prejudices overcome. Other points not mentioned in the outline here given may be introduced, at the discretion of the teacher, and in order to meet local requirements. Some points may, of course, be omitted for the same reason, but in general the plan here suggested will be found fairly satisfactory in the majority of schools.

It should be noted that in this personal hygiene inspection the questions are asked so that the negative answers indicate the number of undesirable conditions existing.

Daily inspection of pupils in the first five grades

1. Are the hands clean?
2. Is the face clean?
3. Is the hair clean, well brushed, and cared for?
4. Are the nails clean and neat?
5. Do the teeth look clean?
6. Has the toothbrush been used?
7. Are the ears clean?
8. Is the clothing neat and clean?
9. Are the shoes neat, clean, and well fitting?
10. Does the child have a handkerchief?

Additional information to be obtained by the teacher, at intervals

1. Is at least one window kept open in the bedroom at night?
2. Does the child drink coffee? How much?
3. Does he drink tea? How much?
4. Does he always have breakfast?
5. What does he usually eat?
6. Does he always have lunch?
7. What time does he go to bed?
8. What time does he get up?
9. Is he suitably clothed?
10. How often does he bathe?
11. Is he required to do any work for pay? What sort?
12. Are the bowels evacuated daily?
13. Has the child apparently any bad sex habits?
14. Does the child use an *individual* toothbrush?
15. Does the child visit a dentist at least once every year?

In the grades one to five, inclusive, little need be done in the way of health instruction beyond the constant inculcation of health habits. In grades one and

two the simple daily inspection will be about all that will be necessary or indeed successful.

Inculcating food habits

Beginning with the third grade, when the average child will be about eight years old, some very simple talks about foods may be introduced. It will be possible to discover what the child usually eats at each meal, what he brings to school for his lunch, etc. It will be possible to teach these little people that they must have a mixed diet, and to explain in common words what this means.

Peculiar and undesirable food habits may be discovered and corrected at this time. The child of this age can be taught how properly to masticate his food. A visit to the domestic science department may be made, and the children instructed how and what to eat by means of some actual meals eaten there under observation. Simple health stories will prove useful at this period in the child's education, such as may be found in Hall's *Primer of Hygiene*. These stories ought to be read and explained by the teacher, and not set as lessons to be recited by the little pupils (a method which never accomplishes any good). Proper eating habits may be rather easily acquired at this time. If the child in the third grade learns how and what to eat, his instruction in hygiene will have been quite satisfactory. Here again the explanation, or why, is entirely unnecessary, and has little or nothing to do with the formation of good habits.

Other health habits may, of course, be formed at this age, and the teacher must use her judgment about what is most necessary to include under particular and peculiar conditions. This will depend largely upon the social status of the average pupil in her class.

Vital topics of hygiene study for grades three to five

The following tabulated suggestions are offered as helpful in instructing pupils from 9 to 12 years of age: —

1. Make lists on the board of what a considerable number of pupils had for breakfast.
2. From this make a list of the good foods, and another of the bad foods.
3. Include in the desirable foods such things as milk, cocoa, well-cooked cereals, bacon, eggs, toast, bread and butter, cornbread, crackers, and fruit, — particularly baked apples and stewed prunes.
4. Include in the undesirable foods such things as coffee, tea, hot breads and biscuits, doughnuts, and hot cakes of all kinds when used to the exclusion of other foods.
5. Make a list of breakfasts which fail to include a sufficient variety of foods.
6. Make a list of breakfasts which include a good variety of foods.
7. Note how many children report breakfasts principally made up of coffee and bread; coffee and doughnuts; coffee and crackers; bread and syrup; or breakfasts which include only starchy foods, or exclusively meat foods. Learn how many have butter. Note how many children eat no breakfast. Find out what time the meal is eaten; how long the child spends at breakfast; whether the child sits at table when he has his breakfast.
8. If necessary, try to get in touch with the parents of children who have inadequate or otherwise undesirable breakfasts. This may often be accomplished by the

school nurse, who sometimes works miracles in home reform.

9. Simple talks on the care of teeth may now be introduced. They ought to be based upon actual conditions discovered in the class by the teacher in the daily and other inspections.
10. Simple lessons on the value of good air may be introduced in the third grade and carried through the other grades. The young child is not interested in the mechanical processes of ventilation, but may easily be taught to value fresh air and to form a dislike for foul air. Teach the child at this time how to detect bad air by the sense of smell, and encourage him to observe in this way the conditions present at school and at home. Proper breathing habits may be profitably taught now, and the teacher will be surprised to discover how few children know how to breathe in the right way.
11. The cleanliness of the schoolroom must be dwelt upon, and the children urged to take part in keeping it free from unnecessary dirt.

If during the first five grades the daily personal and the general inspection at intervals be observed, and knowledge of good food, fresh air, and cleanliness of environment be insisted upon, the child will have formed the most fundamentally important habits of health. But the teacher must never forget that what she is teaching is not "lessons," but habits, and that, therefore, she must never fail to relate each and every part of her instruction to the daily life of the pupil.

To sum up what the average pupil ought to have acquired by the time he has reached the sixth grade, we will say: —

1. He ought to appear at school with reasonably clean hands, face, ears, and body.
2. His clothes ought to be neat, and free from avoidable dirt.

3. His shoes ought to be reasonably clean, and well enough fitting to avoid injury to his feet.
4. He must have acquired a love for fresh air, and an antipathy toward bad air.
5. He must have learned by experience the value of a well-ventilated bedroom and schoolroom.
6. He must have learned to eat properly, and to know in general what to eat and what not to eat.
7. He must have learned to value not only cleanliness of person, but cleanliness of immediate environment.
8. He must have learned how much to sleep, what time to go to bed, and what time to get up.
9. He must have acquired the habit of evacuating his bowels daily.
10. He must have learned to value a clean mouth and clean teeth, to use his toothbrush daily, and to visit a dentist at least once a year.

Teaching hygiene in the sixth grade

Beginning with the sixth grade, the character of hygiene teaching should be considerably changed from that given in the earlier grades. One of the best methods for presentation to children of this age (about 11 or 12 years) is that which has been employed with remarkable success by the Health Department of New York City in its "Little Mother's League."

Hygiene lessons dramatized

Under the guidance of a skillful woman physician and school nurse, little girls of 10 to 12 years of age are taught simple, practical lessons in home hygiene, including such things as the care of milk, foods for babies and young children, the general care of babies, keeping the home clean, the value of fresh air, and

other useful lessons on the health of the home. Following a lesson on a subject such as, for example, the care of milk, certain children (usually two) are appointed to write a little drama and present it before the other members of the League. This method interests the children tremendously, and impresses the subject upon their minds more effectively than anything else could. One of the writers of this book witnessed such a play given by a division of the "Little Mother's League," of New York City, in the summer of 1911, and was greatly impressed with the value of this sort of health instruction.

No attempt is made by the teachers to correct the phraseology of the actors in the play, but they are allowed to present the subject exactly in their own way. The only requirement on the part of the teachers is that the subject-matter shall be essentially correct. This means that children teach other children in words of their own, an innovation in teaching which accounts for the wonderful and instant success which the method met as soon as it was introduced. This method may be easily adapted to classes in the public schools, and to mixed classes as well as to little girls alone. It seems rather remarkable that the most successful method ever devised for teaching useful health lessons to children of this age should have originated, not in the public schools, but in a great city health department which has not ordinarily been looked upon as responsible for teaching of any sort. This is another illustration of the fact that some of the best methods

of teaching originate outside of school systems, and is in line with the growing demand of to-day that teaching methods and lesson materials be in touch with the real life of the everyday world.

The efficient and conscientious teacher will at once grasp the wonderful possibilities of this kind of instruction through play, and easily adapt it to all the practical needs of pupils of the sixth grade.¹

Reading material may be employed at this time, if desired, although this is not in the least an essential requirement for any but the teacher who is devoid of initiative and interest in her subject. The writers would mildly protest against any required text for pupils of this grade, but would recommend supplementary reading, of which there is now fortunately available an abundance of the best sort.

Outline of scheme for teaching hygiene in the sixth grade

The following is a list of subjects from which selections for discussion may be made by the teacher, and followed, in some cases, with appropriate supplementary reading by the pupils:—

1. Care of milk.
2. Handling of food at home, in bakeries, stores, markets, etc.
3. Preparation of food.

¹ The Louisa Alcott School of Boston has carried this idea still further by the use of *models* of all kinds, which the children make. The exhibit of this school at the International Congress of Hygiene at Washington in 1912 was most impressive.

4. Preservation of food.
5. Eating habits.
6. Disposal of garbage.
7. Pure water supplies.
8. Disposal of sewage.
9. Water and purification.
10. Flies and their control.
11. Mosquitoes and their control.
12. Fresh air.
 - (a) At home.
 - (b) At school.
 - (c) In factories, stores, theaters, churches, etc.
13. The skin.
14. The teeth.
15. The eyes.
16. The ears.
17. The nose and throat.
18. Colds.
19. Headache.
20. Personal habits.
 - (a) Clothing.
 - (b) The bowels.
 - (c) Play exercise.
 - (d) Sex habits.
 - (e) Sleep.
 - (f) Bathing.
 - (g) Work.
 - (h) Food.
 - (i) Coffee, tea, tobacco, alcohol.

Following the discussion and supplementary reading of the subjects indicated in the list given, pupils should be asked to make personal observations, report personal experiences, and in general should be encouraged to take an active part in the lessons. Technical explanations should be diligently avoided, and memory work discouraged.

The teacher may now encourage the preparation

and presentation of health plays on certain profitable topics. For advice on this subject teachers are recommended to correspond with the Division of Child Hygiene of the New York City Board of Health, requesting details as to the management of the "Little Mother's League."¹

¹ For references, see p. 251.

CHAPTER XV

THE TEACHING OF HYGIENE: SEVENTH AND EIGHTH GRADES

Early instruction must deal with the concrete

WHEN the pupil has passed into the seventh grade he is ready to begin the formal study of hygiene. Until this period he should have been occupied primarily in establishing proper health habits. If he has been led along the right educational paths he will have accomplished this object. It will now be possible to pay less attention to matters of personal health, and to concentrate attention more particularly upon matters of environment. At this time it will be possible and desirable to begin to instruct the pupil definitely about bacteria — what they are, what they do, how they are carried about. To attempt to do this before the child is about 12 or 13 years old will result in little real good.

The young pupil must be confronted only with concrete ideas, ideas rather closely related to his daily experiences. To attempt to present a subject which deals with the invisible world, as does the study of bacteria, is to violate one of the commonest principles of pedagogy, namely, that the child must be led gradually from the concrete to the abstract, from the known to the unknown. Beginning with the seventh grade, however, simple demonstrations, illustrating

the relation of germ life to the various processes of human life, may be successfully introduced.

Focus attention upon health, rather than upon disease

The teacher cannot, however, be too careful to avoid focusing attention too much upon disease. The whole object of hygiene in the schools must be to teach health, not disease. How to keep well and strong is the desired object at this time. The avoidance of disease will naturally follow when the pupil is properly instructed in the simple principles of health. Several of our otherwise useful modern texts on hygiene for the schools err in this respect, with the result that a sensitive child is more likely to be impressed with the morbid rather than the wholesome in daily life.

Some hygiene texts, in their laudable attempts to escape the errors, platitudes, and gross exaggerations of the older texts, have done nearly as much harm in too severely adhering to the pathological scientific discoveries of the day, while at the same time ignoring the fact that the child has not acquired any true perspective which will enable him to view things in their proper proportions. People may be easily frightened by too much truth, or rather by truth presented at too acute an angle. All that is necessary and essential in matters pertaining to disease may, if done at the right time, be easily presented without in the least frightening the child. When taught in the right way, and opportunely, modern ideas of hygiene and sanitation need never alarm any one.

Learning how to meet his environment constitutes, as Professor Huxley long ago said, a liberal education for the child. It is never ignorance, but knowledge, which leads to health, and therefore to happiness. Man has always been most afraid of those things which he does not understand. One need fear disease far less when one really understands its nature and how easily it may usually be avoided.

Before beginning the study of bacteria, the young student will do well first to observe some of the related forms of life with which he is more familiar. For this nothing can serve a better purpose than common yeasts and molds. Every child knows what these are, but few know just how they grow and what they do.

Practical instruction in bacteriology for the seventh and eighth grades

For further suggestions and definite explanations the teacher is referred to Professor Conn's *Bacteria, Yeasts, and Molds*. None of the experiments given require any special training or technical skill, and therefore no teacher need feel discouraged from attempting to carry out the directions given.

Apply the knowledge gained in the experiments on bacteria, yeasts, and molds to the keeping-power of various foods; to the condition of the air of various rooms; to the cleanliness of hands, etc.¹

¹ If the teacher is in California, she should apply to the State Hygiene Laboratory at Berkeley for a set of demonstration plates, illustrating the growth of bacteria. In connection with this topic the teacher should read Conn's *Bacteria, Yeasts, and Molds* (Ginn & Co.).

The teacher must make it very clear to the pupil that bacteria, yeasts, and molds are true plants, and therefore dependent upon similar conditions for their growth as plants of a higher nature. She must also let the pupil understand that, while most bacteria are perfectly harmless plants, disease bacteria are spread about in the same way as the harmless variety.

Have the children note how colds spread in a room at school, and ask them to offer explanations. Apply the knowledge of colds to other forms of sickness. Ask for suggestions on the prevention of the spread of diseases. The value of general cleanliness, pure air, sunshine, clean food, pure water, and milk must be emphasized at this time.

Let the pupil try to answer the following questions after having completed the study indicated in this section: —

1. What is yeast?
2. How does it get into food?
3. What kind of food does it need for growth?
4. How does it grow?
5. Why does it make bread rise?
6. What effect does heat have upon yeast?
7. Why will yeast not grow in preserved fruit?
8. What is required for the growth of molds?
9. On what sorts of things do molds grow?
10. How may the growth of molds be prevented?
11. Where do molds come from?
12. Where are bacteria found in greatest numbers?
13. Why does boiled milk keep longer than raw milk?
14. What sort of milk has the largest number of bacteria?
15. What is a good test of clean milk?
16. How do bacteria get into food?
17. What kind of air has the greatest number of bacteria in it?

18. What kinds of things carry bacteria?
19. How may food be kept from spoiling?
20. How are disease bacteria spread from one person to another?

Teaching hygiene by means of "sanitary surveys"

Following a general study of bacteria, in the manner outlined in the preceding section, the pupil may now be interested in making "sanitary surveys" in his immediate neighborhood. The plan which follows is not given from the idea that it ought to be strictly followed, but merely for its suggestive value. Teachers must use their judgment in adapting it to varying school conditions. In some instances it will be necessary to simplify the questions; in other instances they may be considerably amplified.

Schools in rural districts must have surveys arranged for them which will meet the particular problems of the country: city schools will present very different sorts of problems to solve. The object of these surveys is to get the pupil in touch with his own particular health environment, to induce him to be observant of actual conditions as he will find them on the way to and from school, at home, on the city streets, in the country, in the school building, at the dairy, and in the market or grocery store.

People endure unsanitary conditions because they have never been taught anything better. Just as soon as they become really observant, they become intolerant of whatever is unwholesome. Sanitary education is of vastly more importance than sanitary legislation.

Pupils in school do not become interested in health through reading about it, any more than they succeed in acquiring an interest in language through the study of technical grammar. Whatever the pupil acquires that is really worth while he gets by actual observation, practice, and action.

Knowledge, to be of any value, must be put to use. The teacher who will make use of the survey plan, as suggested here, will be astonished at the results obtained, both in respect to the information gained and interest aroused in the pupil, and to the beneficial results reacting on the whole community. Such a plan recognizes the fact that the pupil is an embryo citizen, and seeks to prepare him for efficient citizenship in his own town or city.

The following sanitary surveys are presented as generally suggestive of the possibilities in the study of a pupil's health environment: —

1. Sanitary survey of a home.
2. Sanitary survey of a market.
3. Sanitary survey of a school.
4. Sanitary survey of a bakery.
5. Sanitary survey of a dairy.

<i>Sanitary survey of a home</i> ¹	<i>Yes</i>	<i>No</i>
I. <i>Location.</i>		
1. <i>Drainage.</i>		
<i>a. Is the house on raised ground?</i>		
<i>b. Is the drainage carried off on all sides by natural or artificial drains?</i>		

¹ These surveys are to be made with the aid of the teacher, and, if possible, the parents.

<i>Sanitary survey of a home</i>	<i>Yes</i>	<i>No</i>
c. Are the grounds kept free from stagnant water?		
II. <i>Sunlight and ventilation.</i>		
1. Has the house good exposure to the sun?		
2. Has it good exposure to the air?		
3. Are the rooms most used on the sunny side of the house?		
III. <i>General interior.</i>		
1. Upon entering the house does the air seem fresh and odorless?		
2. Is the house free from flies?		
3. Are there at least two outside windows to a room?		
4. Have they screens?		
5. Is the heating arrangement adequate for the size of the house?		
6. Does it furnish fresh air for ventilation?		
7. Is the number of occupants consistent with the size of the house?		
8. Is the plumbing modern and open?		
9. Are the lights placed so as to avoid a glare?		
10. Can the floor coverings be removed and easily cleaned?		
11. Has the feather duster been discarded?		
12. Are useless hangings and decorations avoided?		
13. Are the floors clean and smooth?		
14. Do the toilets have an outside window for light and ventilation?		
IV. <i>Sleeping apartments.</i>		
1. Are there fewer than three occupants to a room?		
2. Do the rooms receive sunlight, at least part of the day?		
3. Is the exposure such as to admit the most and best air?		
4. Are the windows open from the top and bottom at night?		

<i>Sanitary survey of a home</i>	<i>Yes</i>	<i>No</i>
5. Is the bed placed in the air currents? 6. Are rugs used in place of carpets? 7. Are bed coverings frequently aired and cleaned? V. <i>The kitchen.</i> 1. Are the windows well screened? 2. Is there a cooler-closet or an ice-box? 3. Is the stove well ventilated? 4. Are the sink and drain-pipe kept perfectly clean? 5. Is the food kept under cover or screen? 6. Is the source of milk supply known? 7. Is the source of water supply known? 8. Is the source of food supplies known? 9. Is the filter cleaned out every day? 10. Is the floor kept clean, and the floor and walls painted frequently? 11. Is there a light dry room in which perishable articles of food may be stored? 12. Is the ice-box frequently cleaned? 13. Are there proper toilet facilities connected with the kitchen? 14. Are clean hand-towels provided? 15. Are the eating utensils of sick persons boiled? VI. <i>The back yard.</i> 1. Are breeding-places for flies avoided? 2. Are breeding-places for mosquitoes avoided? 3. Is the yard kept free from rats and mice? 4. If there is an outside privy, is it kept in a sanitary condition? 5. If there is a cesspool, is it cleaned out when necessary? 6. Are wells and cisterns protected from drainage from contaminated sources? 7. Is the drinking-water known to be safe? 8. Is the ground kept free from slops and all refuse and filth?		

<i>Sanitary survey of a meat market</i>	<i>Yes</i>	<i>No</i>
1. Is the market in a sanitary location?		
2. Is the building well constructed?		
3. Is the cellar rat-proof?		
4. Are the outhouses and stables sufficiently removed?		
5. Is barnyard refuse and market refuse frequently removed?		
6. Are the general premises clean?		
7. Are the meat scraps kept in metal cans?		
8. Are the premises free from rats?		
9. Are the floors of concrete, or other impervious material?		
10. Are the doors made to swing?		
11. Are windows and doors screened?		
12. Is the place free from flies?		
13. Are counters made of marble, or glass, or hard wood?		
14. Are they screened to prevent handling of meat?		
15. Are the refrigerators clean?		
16. Are clerks clean and healthy-looking?		
17. Are they well protected with clean aprons?		
18. Is all meat protected from flies and dust?		
19. Are tables, trucks, racks, refrigerators, refuse boxes, floors, and tools cleaned daily?		
20. Is the source of meat known?		
21. Is it federally inspected?		
22. Is it city inspected?		
23. Is the meat delivered in covered wagons, and kept carefully wrapped until it reaches the purchaser?		
24. Are the carcasses kept carefully wrapped while being transported to the market?		
25. Are the wagons clean?		
26. Are the refuse wagons covered?		

<i>Sanitary survey of a bakery</i>	<i>Yes</i>	<i>No</i>
I. Location and construction.		
1. Is the building in a sanitary location?		
2. Is it a sufficient distance from stables and outhouses?		
3. Is barnyard refuse frequently removed?		
4. Is the cellar rat-proof?		
II. The salesroom.		
1. Are the doors screened?		
2. Are they double-hinged (swinging)?		
3. Is the food kept covered under glass?		
4. Is the store clean and free from flies?		
5. Are the clerks protected by clean aprons?		
III. The bakery.		
1. Is the dough mixed by machine?		
2. Are the floors of the bakery clean and dry?		
3. Is the bread wrapped before sending it out on the wagon?		
4. Has the baker or any of his employees tuberculosis, or any other contagious disease?		
5. Are they clean and careful in personal habits?		
6. Are pet animals kept out of the bakery?		
7. Is there night-work in the bakery?		
8. Is the ceiling free from dirt and cobwebs?		
9. Is the ventilation good?		
10. Are there windows enough?		
11. Are the storage facilities good?		
12. Are there toilets?		
13. Are they properly located?		
14. Is there a place for people to wash their hands?		
15. Are individual towels used?		
16. Is the bakery free from cockroaches and other vermin?		
17. Are utensils and machines kept clean?		
18. Are flies kept out?		
19. Is garbage kept covered in metal cans?		
20. Is it frequently removed?		

<i>Sanitary survey of a school</i>	<i>Yes</i>	<i>No</i>
I. <i>Ventilation.</i>		
1. Are the rooms well ventilated?		
2. Does the air smell clean and fresh?		
3. Is there some method for humidifying the air?		
4. Are the rooms well aired at recess?		
II. <i>Lighting.</i>		
1. Are the rooms evenly lighted?		
2. Is the window area at least one fifth of the floor area?		
3. Are the desks so placed as never to face direct sunlight?		
4. Are dark window-shades avoided?		
5. Are yellow or linen-colored shades or Venetian blinds used?		
6. Is the tinting of the walls light?		
7. Is the ceiling lighter than the walls?		
8. Is over-decoration avoided?		
9. Does all the light come from one side, the left?		
10. Is there eight feet of space between the front wall and the first window?		
11. Does the light enter the room from the east or west?		
12. Do the windows reach within a foot of the ceiling?		
13. Are the seats in the darkest side of the room no farther than twenty-four feet from the windows?		
III. <i>Temperature.</i>		
1. Is the temperature kept over 65 degrees, and less than 70 degrees?		
2. Is there a thermometer in each room?		
3. Is a daily temperature chart kept in each room?		
IV. <i>Cleaning and sweeping.</i>		
1. Has the feather duster been discarded?		
2. Is a damp cloth used for cleaning up dust?		

<i>Sanitary survey of a school</i>	<i>Yes</i>	<i>No</i>
3. Are the windows washed at least three times a year?		
4. Has dry sweeping been abolished?		
5. Is oiled sawdust used on the floors when sweeping is done?		
6. Are the floors oiled at least twice a year?		
7. Are the floors free from sticky oil?		
8. Are the rooms well aired at the time of cleaning?		
9. Are the desks and all articles of furniture kept constantly clean?		
10. Are desks re-dressed at least every two years?		
11. Are desks washed with a disinfectant when necessary?		
12. Is the common use of articles which might carry infection avoided?		
V. <i>The pupils themselves.</i>		
1. Are pupils required to keep their hands and faces clean?		
2. Is the clothing of the pupils reasonably clean?		
3. Are pupils with poor eyesight seated near the front?		
4. Are deaf pupils seated near the front?		
5. Are pupils with skin diseases excluded?		
6. Are pupils with any contagious disease excluded.		
7. Is there any health supervision of pupils?		
8. Is there a school nurse?		
9. Do the teachers make any physical examinations of pupils?		
10. Is hygiene taught? How is it taught?		
11. Are the desks adjustable?		
12. Are they adjusted to the pupils?		
VI. <i>General sanitation.</i>		
1. Are paper towels provided?		

<i>Sanitary survey of a school</i>	<i>Yes</i>	<i>No</i>
2. Is liquid soap provided? 3. Are there any shower-baths? 4. Are drinking-fountains provided? 5. Is the common drinking-cup abolished? 6. Has the roller-towel been abolished? 7. Has the common hand-towel been abolished? 8. Is there a comfortable lunch-room for pupils. 9. Is there a comfortable rest-room for teachers? 10. Is there a "FIRST-AID" emergency outfit supplied? 11. Does anybody know how to use it? 12. Are toilets clean? 13. Are toilet-rooms well ventilated? 14. Are toilets kept flushed? 15. Is the basement light and clean? 16. Are the school grounds kept perfectly clean? 17. Is the drinking-water safe to use? 18. Has any investigation of the water been made? 19. Are ventilated coat-closets provided? 20. Is fire drill practiced frequently?		
<i>Sanitary survey of a dairy</i>		
I. <i>The barn.</i>		
1. If made of wood, are the walls frequently whitewashed? 2. Are walls and ceilings kept clear of cobwebs? 3. Are windows so located as to prevent direct drafts on the animals? 4. Is the barn well ventilated? 5. Are floors made moisture-proof? 6. Are gutters (preferably of cement) provided behind the stalls?		

<i>Sanitary survey of a dairy</i>	<i>Yes</i>	<i>No</i>
7. Do they drain properly?		
8. Are the stalls kept clean?		
9. Are ceilings dust-proof?		
10. Is a clean wash-room provided for the milkers?		
11. Are paper or individual towels furnished?		
12. Is the roller-towel abolished?		
13. Is liquid soap provided?		
II. <i>The milk-house.</i>		
1. Is there a milk-house separated from the barn, and used for no other purpose?		
2. Is it clean?		
3. Is it screened?		
4. Is it provided with a cement floor?		
5. Are flies kept out?		
6. Is it cool?		
7. Is the milk kept covered?		
8. Is the milk cooled to at least 50 degrees?		
III. <i>The utensils.</i>		
1. Are all utensils kept clean?		
2. Are pails, cans, and bottles and other utensils steamed or boiled before using?		
3. Are all utensils which have been exposed in a house where there has been a contagious disease carefully sterilized?		
4. Is the patent milk-pail with cover used?		
5. Is the milk milked through gauze?		
6. Is the gauze always boiled and dried before using?		
IV. <i>The premises.</i>		
1. Is manure removed at least once a week?		
2. Are domestic animals kept away from the premises at the time of milking?		

<i>Sanitary survey of a dairy</i>	<i>Yes</i>	<i>No</i>
<p>V. <i>The surroundings.</i></p> <ol style="list-style-type: none"> 1. Is the barnyard clean and well drained? 2. Are outhouses well removed from the vicinity of the barn and milk-house? 3. Are sheds provided for animals? 4. Is the water supply safe? 5. Is the well (if any) so situated that no contamination can occur from a privy or other source? 6. Is all sewage contamination of water supply avoided? 7. Are garbage and manure prevented from accumulating? 8. Are breeding-places for flies avoided? 		
<p>VI. <i>The animals.</i></p> <ol style="list-style-type: none"> 1. Are the cows kept clean? 2. Are the cows tuberculin-tested? 3. Are all the cows with any suspicion of disease kept away from the others? 4. Are cows kept away from sewage-infected streams? 		
<p>VII. <i>The milkers.</i></p> <ol style="list-style-type: none"> 1. Do milkers wear clean, special milking-suits? 2. Do milkers keep their hands clean? 3. Are all milkers in good health? 4. Are milkers who have been in association with cases of transmissible diseases kept away until danger is past? 		
<p>VIII. <i>The "bunk-house."</i></p> <ol style="list-style-type: none"> 1. If a house for milkers is provided, is it kept clean? 2. Is it well ventilated? 3. Is there a suitable wash-room? 4. Are the beds clean?¹ 		

¹ It is not expected that every dairy, and especially those in rural districts, will come up to the ideal suggested here, but they should approximate it in all essential matters.

HELPS FOR THE TEACHING OF HYGIENE IN THE GRADES

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CHAPTER XVI

THE TEACHING OF HYGIENE: EDUCATION WITH REFERENCE TO SEX

The problem

EVERY teacher should have a true conception of the frequency with which ignorance of the laws of sex is responsible for sickness, misery, and death, industrial inefficiency, the infection of the innocent, and life-wreckages of many other kinds. The economic losses accruing from such ignorance doubtless exceed many millions of dollars annually in the United States alone, while the more important ethical and moral losses are of course not measurable at all. An adequate discussion of this aspect of the problem would lead us beyond the limits of the present chapter, and the reader is accordingly referred to the judicious treatments of the subject by Stanley Hall, Dr. Prince Morrow, and Professor Henderson.¹ As a rule even intelligent, well-educated persons are not well enough acquainted with either the moral or the hygienic importance of the problem.²

¹ See references at end of this chapter.

² Searching investigations made by our most reliable authorities have revealed the fact that the prevalence of social diseases is far greater than most of us have believed. It is estimated that at least 60 per cent of the males in this country have contracted the "red plague" (gonorrhœa) at least once, and that 2,000,000 of our people,

Need of safeguarding school children

Another aspect of the problem, touching the school even more directly, is the question of improper sexual conduct among children in the upper grades and high school. In even the best regulated, coeducational high school there is almost always a greater or less undercurrent of interests and events which are unwholesome even when they are not positively immoral. Sometimes only a very few of the pupils are involved,

many of them innocent women and children, are victims of the "black plague" (syphilis). Over one third of these are innocently infected. Reliable statistics indicate that each year about 10 per cent of the entire adult male population of the large cities are treated for one or the other of these diseases. In a city like New York this amounts to almost a quarter of a million cases annually, or more than seven times as many as the number of cases of diphtheria, scarlet fever, smallpox, measles, and chickenpox combined. Morrow estimates that 20 per cent of the venereal infection is acquired before the twenty-first birthday. Of the million boys who arrive at puberty annually in the United States, not far from half are venereally diseased within a few years.

These conditions are not peculiar to the United States, but are common to practically the entire civilized world. Thus, in Germany, of the 8,500,000 persons included in the industrial insurance regulations, 500,000 each year receive sick benefits from this cause. This is about 6 per cent of the enrollment. The proportion for waitresses rises to 13.5 per cent, for young salesmen to 16.4 per cent, and for university students to 25 per cent. For a study of the moral conditions in American colleges the reader is referred to Birdseye. (See reference 3 at end of this chapter.)

It is now quite well known that about one third of all blindness, and 80 per cent of congenital blindness, is due to *ophthalmia neonatorum*, or venereal infection of the child's eyes during birth. The social diseases are responsible also for about one half of the internal surgical operations which women undergo, for perhaps half of the sterility, and for about 15 to 20 per cent of the admissions to our insane hospitals.

sometimes many; children from the "best homes" hardly less often than others.

Teachers and school officers too often rest in strange ignorance of things which pass before their very eyes. Often they are indignant if the problem is even called to their attention, blind, it would seem, to the very existence of this most imperious and most pervading of all human instincts. But when overt immorality among their pupils stands unmistakably revealed, these same persons are the ones most likely to turn with heartless severity upon the offenders, to banish them from the school as "degenerates." In such cases one or two pupils are made the scapegoats and expelled, as though to vindicate the honor of the school and to reestablish the self-respect of those who are responsible for its reputation. The inhuman and unsympathetic treatment sometimes meted out to such offenders, who may be mere children and sinned against rather than sinning, would be impossible in any man who had not completely forgotten the storm and fire of his own adolescence.¹

We should avoid alike the folly which ignores the evils and the cruelty which combats them with heartless punishment and other summary measures. We must consent to face honestly and without prudery or

¹ "Of all cultivated classes, educators alone remain timid and inactive. . . . Teachers, who have the rarest opportunity to observe, have learned nothing and ignore the truth." (STANLEY HALL.)

"The very persons to whom to-day we have to look to effect the sexual enlightenment of children are themselves, to a great extent, also in need of enlightenment." (ALBERT MOLL.)

hypocrisy the actual situation: the fact that in most boys and in many girls the sexual emotions do not lie dormant until the traits of will and character have developed sufficiently for their proper control; the fact that very few boys and not all girls reach manhood or womanhood without at least for a time falling victims to reprehensible practices or conduct; the fact that many children from homes otherwise admirable have been so poorly instructed that their ideas of sexual matters are sufficiently grotesque and distorted to render almost any kind of conduct on their part pardonable and pitiable.

The entire world is at last awakening to the seriousness of the problem. In almost every civilized country active organizations have been effected for the purpose of combating the evils by means of social, penal, and industrial reforms, and by more thoroughgoing enlightenment of the young.

The school's relation to sex-education

The relation of the school to the entire problem of sex-education is fairly well indicated by the expressions of belief regarding the following propositions, submitted in 1912 by the American Federation of Sex Hygiene to leading educators, physicians, and public men in various parts of the country. About one hundred replies were received, for the most part from just those persons who by virtue of their interest and experience are best entitled to a respectful hearing on the subject. The propositions and votes thereon are as follows:—

Proposition I

The well-known facts concerning the widespread ignorance, misunderstanding, and misuse of the human sexual function point clearly to the need of special instruction of young people in the scientific principles of sex.

Affirmative, 91; negative, 0; doubtful, 5.

Proposition II

As it is well established that few parents are both qualified and willing to give their children this vital instruction, it is necessary that such instruction be given in the public schools, both elementary and high, in colleges, and in other organized educational agencies.

Affirmative, 73; negative, 7; doubtful, 11.

Proposition III

The scientific basis of sex-instruction should be laid in the biological nature-study of elementary schools and the biological courses of higher schools and colleges. Beginning with the nature-study lessons of the primary grades, life-histories of living things should be emphasized. In the advanced nature-study of the grammar grades and the biology courses of the high school there should be a gradual presentation of the leading biological facts of animal and plant reproduction. It should also be incorporated in courses in hygiene and in ethics.

Affirmative, 80; negative, 3; doubtful, 3.

Proposition IV

Specific instruction applying the biological facts to human life is needed, preferably at the end of the biology course in the early years of high school.

Affirmative, 75; negative, 1; doubtful, 2.

Proposition V

Since numerous pupils never reach the high school, there is need of some definitely organized instruction relating to human life for pupils of grammar-school ages. This is the most difficult problem now apparent.

Affirmative, 73; negative, 6; doubtful, 9.

Proposition VI

Provision should be made for sex-instruction in evening schools, in forms adapted to the needs of various types of students.

Affirmative, 72 negative, 1; doubtful, 2.

Proposition VII

In order to appreciate the problems and coöperate with special teachers all teachers should know the fundamental biological, hygienic, and ethical facts relating to sex-processes. To this end, teachers' training-schools should offer courses of biology and selected reading which give the needed knowledge.

Affirmative, 82; negative, 0; doubtful, 8.

Proposition VIII

While the nature-study and biology classes may be coeducational, as abundant experience has proved, the special application of biological facts to human life should be in separate classes.

Affirmative, 82 negative, 0; doubtful, 5.

Proposition IX

Special lectures under the auspices of clubs, churches, and other associations interested in general education should be established in order that the sex-education movement may reach parents and young people who are not connected with schools.

Affirmative, 86; negative, 0; doubtful, 0.

Proposition X

The above propositions refer to instruction in normal sex-processes. Such instructions should obviously be made basal. But, at the proper time, instruction should be given also as to: (1) the danger of unnatural and unhygienic sex-habits; (2) licentious or irregular sexual indulgence; (3) and later, the impressive facts relating to the dangers of social diseases, and the consequences to themselves and others. Instruction in regard to the last two should be given only to the upper classes of the high school and to students in college, by care-

fully selected instructors, preferably by those with special training in medicine or physiology, and at the same time possessing tact and skill; but all teachers should be prepared to help individual students who may need advice.

Affirmative, 85; negative, 3; doubtful, 2.

Proposition XI

While instruction concerning abnormal conditions is largely a problem relating to adolescents, some direction of individuals is sadly needed by many children in the two or three pre-adolescent years; and it is to be hoped that every school will finally have one or more competent persons (principal, nurse, doctor, or teacher) able to deal effectively with the individuals needing help.

Affirmative, 81; negative, 0; doubtful, 5.

Proposition XII

The introduction of sex-instruction into the public educational system should be made carefully, and with due regard to local conditions, such as the attitude of school officials, public opinion, and the availability of specially trained teachers. Nothing could be more undesirable than precipitate introduction of sex-instruction by propagandic legislators, or by over-zealous school officials. Far better results are to be expected if the teachers and parents interested in each school are first awakened to the need of special instruction; and then the work should be developed gradually, quietly, conservatively, and on a sure foundation.

Affirmative, 90; negative, 0; doubtful, 4.

As to the need of some kind of education of the young with reference to sex perhaps every reader will agree with the authorities quoted. We cannot, even if we would, keep the child long in the innocence which rests upon ignorance. The child's interests in matters of sex are far more precocious and far more intense than appears on the surface. If the information which is sought is not gained from sources that are reliable

and pure, it will be found in sources that are less desirable. There is no third possibility. The "conspiracy of silence" has always and everywhere proved an utter failure.

Special considerations relating to sex education

The points on which disagreement arises have mainly to do with (1) the proper place for the instruction to be given, whether in the school or at home; (2) the content of such instruction; (3) the method of approach; and (4) its appropriate time in the life of the child. These questions can be answered only with an understanding of their relations to each other, and in the light of certain general principles. The subject is too difficult to make dogmatism safe. The following, however, are important considerations: —

(a) The purpose of sex-education should not be too narrowly conceived. The end cannot be attained by a few "sex-talks," stating bluntly the facts of the sex-life and painting in lurid colors the evil results of transgressions. The purpose of such education is much farther-reaching, and involves, indeed, the gradual shaping of the child's attitude toward fundamental ethical values, the patient molding of a whole character.

(b) We must clearly understand also that knowledge, alone, does not meet the requirements of this kind of education. Mere information, however exact, does not insure right conduct. The problem is less one of enlightenment than of moral education. The will

must be made the master of the instincts. To reinforce the will, the "thou shalt not" needs to be replaced by the uplifting power of inspiring ideals, intellectual enthusiasms, and wholesome respect for the integrity of body and mind. The life needs to be filled so full of good work and wholesome play that superfluous energy will not seek improper outlets. The sexual instinct is not to be so much repressed as *sublimated*; its energies directed to secondary channels and transformed into higher values.

(c) The school needs to lay greater emphasis upon the broader relations of moral education, which should be interpreted to include training in social coöperation, acquaintance with social and civic responsibilities, the inculcation of habits of personal hygiene, respect for the body and pride in its capacities, love of outdoor life and sports, notions of chivalry, preference for good literature, a taste for music and art, etc. Nor can the school itself be an effective agent in moral education until its own moral dangers are frankly recognized. To overwork the device of emulation; to lay the stress upon getting ahead of others; to neglect the multitudinous opportunities offered by the school for practical training in social duties and responsibilities; to divorce the teaching of history and civics from all reference to modern social and industrial environment; to herd adolescent boys and girls promiscuously in crowded schoolrooms and narrow hallways where intimate physical contact is possible or unavoidable; to neglect the careful chaperonage of school children on

social occasions, school picnics, etc.; to induce congestion of blood in the pelvic regions by five or six hours of sedentary work, unrelieved by physical activity; to treat all reference to sex problems with prudery and repression: — all of these mistakes lay a burden of guilt upon the school which it cannot without hypocrisy deny. When the school has cleared itself from all blame in these particulars, and has set a thoroughly wholesome environment for the adolescent boy and girl, it will be in better position to campaign for the coöperation of parents for the sex-education of children.

(*d*) Sex-pedagogy differs in one fundamental particular from the pedagogy of any other subject; it must not seek to create special interest in the material presented. For this reason, vague allusions which excite curiosity, and pictures, charts, or diagrams which center attention upon the physiological processes of reproduction, are to be avoided. Some of the booklets prepared by well-meaning but unpedagogical enthusiasts, and designed for the use of the pupil, are thoroughly vicious in this respect.

(*e*) Wherever the special instruction is given, whether in the home or the school, timeliness must be observed. Too early instruction may create the vices it seeks to prevent. The greater danger, however, is that the instruction best suited for each period of development will be unduly delayed.¹

¹ "Better a year too early than an hour too late" has been the slogan of the reformers.

On account of the age element, mass instruction in sex-hygiene by school grades is always indefensible. A fourth-grade class will usually be found to contain children all the way from 8 to 13 years of age. A sixth-grade class may range from 10 to 15 years, or an eighth-grade class from 12 to 17. For sex-instruction children should always be classified by ages, not by grades.

(f) It is questionable whether mass instruction by means of "sex-talks," unrelated to other lines of instruction, should ever be permitted, even when the pupils are classified on an age basis. Children of the same age may differ very greatly in physiological maturity, in the amount of sex-information they already possess, in innocence, and in their emotional reaction to the instruction given. The sudden presentation of the brutal facts of sex is almost sure to prove a nervous shock to some children, in whom it may give rise to morbid ruminations, phobias, etc.

(g) Just here lies the great danger in exaggerating the evils of solitary vices. The views commonly held by teachers and other intelligent people on this point are colored by the extravagant exaggerations depicted in the literature disseminated by quack doctors. If the teacher learns that a feeble-minded or weakly or incorrigible child in her class is guilty of such practices, she is likely to conclude that the defect or perversity is due solely to the bad habit. It is now universally admitted by the best medical authorities that the evils of solitary vice are in most cases confined principally to their indirect effect upon morals, self-respect,

etc., and to the resulting shame, worry, and other morbid ruminations. Nothing but evil can come out of scare-literature or scare-instruction. Quartering people alive in the sight of the public did not stop crime, nor will the horrible and essentially untruthful depictions of the evils of impurity lead children into paths of morality; what it will do is to drive a good many of them to the verge of insanity.

Methods and content of instruction by stages

Much experimentation will be necessary to determine the proper content and the most effective methods of sex-education. Our present knowledge and experience, however, justify the following tentative outline, which is offered purely for whatever suggestive value it may have: —

One to six years. No instruction is necessary in the first half of this period, but habits of cleanliness should begin. Sleep, diet, bathing, etc., are very important. Care should be exercised with regard to choice of nurse. Male infants should be circumcised. Innocent habits of unnecessary touching and handling should be guarded against.

At this period the trait of frankness may become deeply implanted in the child's nature, or its growth may be prevented or delayed. Extreme punishments breed cowardice and destroy confidence. As soon as the child's curiosity awakens regarding the origin of babies, he should be told the truth, in language simple and unevasive. This will usually occur about the age of

four or five years. The instruction at this point need not include the facts about paternal relationship, because the child has not yet begun to wonder about this.

Six to twelve years. In the first half of this period the teaching of nature-study should acquaint the child gradually with the processes of reproduction in plants. The function of flowers, pollen, and seed, and the method of fertilization should be made thoroughly familiar.

The program for the second half of this period should include similar study of typical animals below mammals, — fish, birds, insects, etc. Nature-study, in the broad sense, should be given a liberal share of the program, and the instruction above suggested could be related in such a way to the general processes of nature, and so gradually and opportunely introduced, that the needed information will be assimilated without attracting morbid attention to sex as such. Indeed, the child will not be consciously aware that he is receiving sex-instruction.

Sometime during this period, probably between the ages of seven and ten, the child will need to be informed, in a general way, regarding the relation of father to offspring. The exact time and the exact extent of the information needed will depend entirely upon the child's spontaneous curiosity.

Indiscriminate warnings against improper habits should not be indulged in, but children known to have formed bad habits should receive private instruction. Here, as elsewhere, the idea should be to make virtue

attractive by instilling ideals of cleanliness, strength, manliness, chivalry, etc.

Twelve to fifteen or sixteen. The biological and hygienic phases of the nature-study program may now receive still further emphasis. The study of animals may be extended to include mammals, the function of the ovum, modes of fertilization, etc. The broader ethical implications should be stressed, the necessity for care of the young, the evolution of mother love, the significance of family life for the species, etc. As before, this will be incidentally woven in with the rest of the course, though its applications to human life can be made somewhat more explicit than in the earlier stages. Because of the prevailing attitude toward sexual matters it may be advisable, where possible, to present mammalian zoölogy to boys and girls in separate classes.

More special sex-instruction at this period is also of prime importance. Well before the phenomena of puberty make their appearance, both boys and girls should know the natural developments that may be expected and their appropriate hygiene. It is shameful and inexcusable that so large a proportion of children reach maturity without any such instruction whatever. This, no doubt, helps to account for a fact which several studies have reliably established, — that from 25 to 50 per cent of women suffer from menstrual disorders. With boys, emphasis should be placed upon the absolute normality of emissions during sleep, and upon the normality and healthfulness of continence.

Fifteen, and beyond. The teaching of biology should here be amplified to include the chief laws of heredity, human physiology with special reference to hygiene, the bacterial origin of disease and the modes of transmission, eugenics, etc. For the first time full particulars may be given regarding the consequences of venereal infection, with special emphasis on the dangers to which innocent women and children may be exposed.

The education of adolescent girls should everywhere include extensive training in household science, and in the hygiene of physical and mental development. Education for motherhood should be its conscious and avowed purpose.

Summarizing, we may say: —

(1) That sex-education should be individualized and adapted both in method and content to the child's stage of development and to his expanding curiosity.

(2) It will be mainly of two kinds; *general* and *special*. The general includes the broad foundation laid by the extensive courses in nature-study and biology. The special includes the direct instruction about sexual phenomena, both normal and morbid. These two types of instruction will not necessarily be kept entirely separate. Indeed, the value of the special instruction will depend largely upon the degree to which it is made an integral and logical part of the whole process of biological enlightenment.

(3) Sex-education must never be considered as an isolated problem, but as one related to the whole question of moral education. Its success will always depend

on the degree to which it is supported by high ideals, wholesome enthusiasms, and a right attitude toward the social world in general.

Divided responsibility of the home and school in sex-education

We are now in better position to say where sex-education belongs. It is obvious that the instruction we have designated as *general*, the biological foundation, should be given in the school. It belongs there because the average parent has neither the time nor the equipment necessary to give it. The school has the time and can equip itself for the work by the introduction of laboratory methods into the elementary school, and by extending the training of teachers in hygiene and biology.

It is equally evident that the instruction designated as *special* belongs partly in the home and partly in the school. The more personal and intimate its nature, the more such instruction becomes the proper function of the home. However, a great deal even of the special instruction can and should be woven in with the school work in nature-study and biology, and when parents are known to be entirely neglectful of their duties in this respect there is no alternative but for the school to assume the entire responsibility for the child's sexual enlightenment.

The school should make every effort to enlist the coöperation of parents by means of popular lectures to parent-teacher associations, conferences with parents

in special cases, etc. Rightly prepared pamphlets explaining the need of sex-education, indicating what such instruction should include and when it should be given, etc., would, no doubt, perform a great service. It is strange that this method has been so little used in this country.

Finally, the complexity of the problem should remind us of the many-sided coöperation which will be demanded for its satisfactory solution. We may mention, for example, its relation to the alcohol question, to the social control of prostitution, to industrial methods, to poverty, to public recreation, to religion, to law, to housing, to newspapers, to divorce, to child-dependency and child-labor, to the reform of medical practice, to coeducation, school retardation, feeble-mindedness, etc.

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CHAPTER XVII

THE TEACHER'S HEALTH ¹

THE teacher's health is an important though neglected aspect of school hygiene. If the teacher is tuberculous the children are directly exposed to contagion at a very susceptible period of life. If she is neurasthenic, nervously unstable, querulous, or discontented, the effects upon the suggestible, sensitive child may be still more unfortunate. The welfare of children is so deeply involved that it is no longer justifiable to make the profession a haven for those of delicate constitution.

There is little reliable information about the health conditions among our half-million teachers. We do not know definitely their mortality rates from various diseases, what class of material enters the profession, to what extent health is injured by the work, or what measures would contribute to the conservation of this most important body of public servants.

Mortality rate and physical morbidity

Balliett's health questionnaire, submitted to 159 teachers, indicated that persons of average physical

¹ For a more extended discussion of this subject see *The Teacher's Health*, by Lewis M. Terman. Published by Houghton Mifflin Co., in *The Riverside Educational Monographs*, 1913, 136 pages.

constitution suffer distinct impairment of health within five to ten years after entering the profession.

Of five hundred New England and Middle West teachers questioned by Dr. Burnham, 37.4 per cent stated that their health had been injured in greater or less degree by the conditions of their work. The factors blamed were, in order of frequency, poor ventilation, bad lighting, nervous strain, standing, noises, overcrowded classes, chalk-dust, and too long periods of unbroken work.

In Europe more extensive data are available. Sigel examined all the teachers of Leipzig, and found 42.8 per cent definitely diseased. Karup's and Gollmer's statistics, from 12,381 German teachers, showed a low mortality rate from all causes combined, but a high susceptibility to tuberculosis and nervous diseases.

Statistics from the National Provident Society of English Teachers, including 18,000 members, show a high morbidity rate from throat and chest troubles, influenza, nervous complaints, and gastro-intestinal disorders. Each year about 12 per cent of the entire number of teachers in this society receive sick benefits. Records of retirement under the English Superannuation Act credit one third of the breakdowns to "neurasthenia," "nervous prostration," and "nervous debility."

By virtue of an admirable Swedish law, granting sick allowances to teachers who have been ill one month or more, we have had, since 1906, complete morbidity records from all the 18,000 teachers of that

country. An average of 4 per cent of the male elementary teachers and nearly 9 per cent of the female elementary teachers are out one month or more each year. The average period of disability is 4.9 months for the former and 5.6 months for the latter. Nervous troubles were responsible for 31.2 to 36 per cent of the illnesses, tuberculosis for 6 to 9.3 per cent, other respiratory troubles for 13.7 to 17.9 per cent, anæmia and general debility for 5.5 to 12.7 per cent, and intestinal troubles for 7.6 to 8.9 per cent. We are also informed that 2.5 per cent of the active teaching staff of Sweden are sufferers from neurasthenia of "a pronounced type," and further that 1.17 per cent of the Swedish female teachers are tuberculous.

If these figures hold for the United States our neurasthenic teachers would number about 12,500, and our tuberculous teachers about 5000. The former are teaching a full half-million children, the latter some two hundred thousand.

Premature superannuation

Teachers become prematurely superannuated. After the age of 45 or 50, new positions are not easily obtained. At an age when the lawyer, physician, minister, or man of affairs is at his zenith, the teacher is looked upon as *passée*. English teachers are retired on pension at an average of 53 years for males and 51 for females. The average age for superannuation of male teachers is 49.1 years in Saxony, and 51.7 in Hesse and Bayern.

Tuberculosis among teachers

The mortality of teachers from tuberculosis is especially high. In Saxony this is 60 per cent higher for the years 20 to 29 than for the general male population, and 23 per cent higher between 30 and 39. In the Netherlands for the ages 25 to 35 the rate is 60 per cent higher than for lawyers, and 30 per cent higher than for physicians. For Switzerland it is 10 per cent higher than for the general population between 20 and 39 years, and 30 per cent higher between 40 and 49 years. From a careful study of the prevalence of tuberculosis among the 3187 teachers of Paris, it was estimated that about 3 per cent of the French teachers in service are tuberculous.

In Ontario, 57 per cent of the deaths among female teachers and about 30 per cent among male teachers are caused by tuberculosis. The corresponding figures for stone-cutters are 65 per cent, for lawyers, 25 per cent, and for farmers, 16 per cent. Official returns from the United States Census Bureau show that for ten of our large cities, averaged together, 39.6 per cent of the deaths among female teachers are caused by tuberculosis, 39.1 per cent among stone-cutters, 26.8 per cent among saloon-keepers, and 13.9 per cent among farmers. For the entire census registration area of the United States the following facts hold with great constancy and uniformity: (1) That for both male and female teachers the mortality rate from tuberculosis ranges from 19 to 26 per cent above

that for persons of the corresponding sex in other occupations; and (2) that for female teachers the rate is from 39 to 43 per cent higher than for male teachers.

Mortality rates, after all, do not tell the whole story. Teachers belong to a highly selected class, both physically and morally, and ought to show a relatively low mortality rate. They also suffer from many minor complaints which do not greatly affect longevity, but which are destructive to efficiency and to the joy of living.

The teacher as neurasthenic

Few teachers of ten years' experience have escaped a nervous breakdown. Probably from 3 to 5 per cent of all our teachers are definitely neurasthenic. All the studies emphasize the exhausting nature of the teacher's work. Of the 305 German teachers replying to Wichmann's questionnaire, 78 per cent suffered nervous troubles, the leading symptoms being morbid anxiety, 45 per cent; fixed ideas, 35 per cent; headaches, 71 per cent; heart palpitations, 58 per cent. These, however, are not average conditions, since the questionnaire no doubt elicited a disproportionate number of replies from those who were ill.

The teacher's short day is more apparent than real. The conscientious teacher usually begins her duties nearly an hour before the class is assembled, and remains at the post until long after the close of the afternoon session. The teacher who can manage to limit

her school day to less than seven hours, exclusive of evening work, may consider herself fortunate. In most cases evening lessons will consume one or two hours additional. Many teachers work nine or ten hours a day.

The teacher's work cannot be adequately measured in terms of hours and minutes. She must work always under full steam. An hour of teaching is probably equivalent, from the standpoint of fatigue, to two hours of ordinary study, done in quiet without the necessity of speaking. Four hours of actual teaching thus represent about eight hours of ordinary office work. Add to this two hours for correcting papers, preparing lesson plans, supervising plays, etc., and the four-hour day has grown to one of ten.

When teachers are overworked they must resort to the friendly protection of mechanical methods. Teachers who are sweated cannot do creative thinking. Overworked teachers degenerate to the plane of lesson-setting and lesson-hearing.

Emotional strain is added to intellectual overpressure. Many a teacher is constantly haunted by a vague fear of unpleasant conflicts with parents, pupils, or the school authorities. Most trying of all is the necessity of working under a school administrative régime which hedges the teacher about with unnatural restraints and destroys her individuality.

Other factors are overwork in the normal school, overcrowded classes, and the presence of exceptional children in the regular classes. Pupils who are incor-

rigible or backward contribute more than their share to the worries of the conscientious teacher.

The investigations prove that it is the beginning teacher who runs the greatest risk of pathological nervous exhaustion. With 47 per cent of Wichmann's neurasthenics the nervous troubles appeared in less than five years, and within fifteen years for 87 per cent. The reason is probably threefold: (1) the new teacher is more prodigal of energy from excess of enthusiasm and because she has not learned the necessity of mental economy; (2) she lacks the experience which would enable her to work with the least expenditure of effort; and (3) the early years act as a sieve to eliminate all but the strongest. Whatever the relative shares of these factors, it should be understood that the first years of employment are critical for the teacher's health. To ignore the laws of physical or mental hygiene at this period is to sow the seeds of lifelong nervous affliction and premature superannuation. School administrators can aid in averting this danger by lightening the burdens of the young teacher, by instructing her in economical methods of work, and still more by patient sympathy, kindly criticism, and frequent encouragement.

Salaries and tenure should be improved. The average salary of the American teacher is about \$450. It takes \$800 for a small family to live in any of our larger cities in the style of a common laborer. Teachers' incomes are as little conducive to physical efficiency as to soul expansion. When teachers have worn them-

selves out or become ill in the public service, they should not be turned out to subsist upon the charity of friends, but should be granted retiring allowances.

Health suggestions for the teacher

The teacher should learn the value of the "factor of safety" in mental economy. She is always in danger of short-sighted prodigality of energy. To live up to the last foot-pound of nervous energy daily is to fall into nervous bankruptcy at the first emergency. The teacher should find the safe limits for her day's work, and abide well within them. Sleepiness and the feeling of fatigue are the twin guardians of the "factor of safety." If their warnings are not heeded, insomnia, worry, and nightmares are pretty sure to follow.

The eyes are the "weak link" in the health of many a teacher. Probably from 10 to 20 per cent suffer from unrelieved but relievable eye-strain. For the teacher to carry on "correspondence courses" with her pupils is to invite disaster. To face a light for several hours a day, as many teachers do, is alone sufficient to break down a good nervous system. When the eyes "go bad" the best oculist in reach should be consulted.

If the teacher would be healthy, she should take varied daily exercise, preferably of the play type. Hobbies such as nature-study, horseback riding, tennis, golf, etc., are to be commended. Collateral work of sedentary nature is to be avoided.

Vacation should be employed in such a way as to

rid the teacher's brain and muscles of the accumulated clinkers of a school year. If she belongs to the well-known variety *pedagogia anæmia*, she should carry to her schoolroom in September many millions more red corpuscles than she could have boasted on the previous commencement day. For the teacher to spend her entire vacation in professional study is intellectual as well as physical suicide. The vacation is preëminently a time for striking a new balance.

No one has more reason than the teacher to know something of dietaries and food-values. Constipation and indigestion drag innumerable teachers along the retrograde path to professional incapacity and premature superannuation. Habits of living and eating which produce costiveness should be blacklisted. The deadly cold lunch, eaten in solemn silence, should be forsworn. Thanks to the thermos lunch-bottle and basket, the cold lunch is no longer a necessary evil.

The pedagogical voice is expected to be anything but pleasant. "Teachers' nodes" are more common than "clergyman's sore throat." The teacher has five "voice days" per week, the clergyman but one. The teacher should therefore guard her voice as something more than an instrument of communication. Success or failure may hang upon its quality. There is the voice which irritates and provokes, and another which inspires quiet and instills respect. In short, the teacher's voice is more important than her grammar. She can preserve it and improve it by learning how to use it and when to remain silent.

The hygiene of character

The teacher's work is likely to have certain reactive influences upon her character. The social instincts tend to atrophy. Teachers traditionally are bookish and unpractical, out of touch with civic and political affairs. Living an individualistic existence, they are always in danger of developing provincialism of intellect and character. The teacher should associate with people outside of her profession, and should keep one foot in the living, throbbing world.

The social instincts of the teacher are also subject to perversions. We refer here particularly to male teachers, who so often are characterized by effeminacy, extreme docility, obsequiousness, and lack of manly force. Not a few superintendents and principals become dictatorial, overbearing, and tyrannical toward their inferiors.

The classroom teacher, also, may become dogmatic, exacting, and meddlesome in her relations to the children. Looking always after their faults and mistakes, she tends to lose sympathy and generosity. She develops into a "Citizen Fixit." Her rules become categorical imperatives. She forgets the value of the personal touch, fails to utilize the leverage of the child's natural instincts of suggestibility, loyalty, and hero-worship, and becomes prosy, prodding, and vexatious.

Other dangers are method-cult, pedantry, and the didactic habit. Verbalism, rules, definitions, and pre-

ciseness of form tend to replace substance. The "rituals," called parsing, and the petty exactitude sometimes required in the formal statement of arithmetical solutions, are good illustrations. Every slightly different way of doing a thing comes to be labeled with a name of its own. Teachers are prone to overestimate the value of what they teach, some of which is obsolete fact, misapplied half-truth, or useless pedantry.

The result of all this is likely to be premature mental decay. The constant contact with little minds may dwarf the teacher's own mental growth. By dint of so many times doing the same thing in the same way she falls a "victim to fixed modes of interpretation." It is hard to be spontaneous, fresh, and inspiring at the hundredth repetition. New categories become less and less possible. The personality becomes "shut in." When this state supervenes, intellectual progress comes to an end; firm, rigid lines settle in upon the soul—it is *habit-bound*.

How to prevent mental fixation

An important antidote is to reserve certain hours each day for a vacation from professional habits. This is recreation, which therefore should become the teacher's religion. It should involve play, the very essence of which is its creativeness and the relaxation from habitual routine, and it should be seasoned with constructive mental activity in some field of art, literature, science, etc. This will foster the attitude of

the learner, without which early decay is certain. The daily recreation will need also to be reinforced by vacations spent in travel or in non-professional study.

The teacher should cultivate the faculty of "doing the usual thing in the unusual way." The artist temperament should be her ideal, for the true artist abhors exact duplications and always endeavors to transvaluate all his experience. In every possible way variety should be mingled with the day's routine. Within certain limits the teacher might be shifted from one grade or one department to another, or, where this is not feasible, a new position should be sought occasionally. To escape the danger of a premature mental arrest, every possible source of life and enthusiasm should be utilized.

The responsibility of the normal school

As regards the first of these points, there is reason to believe that the intense strain of the normal course directly contributes to the human wreckage which litters the profession. Hardly any one will deny that normal-school students are as a rule overworked, but the overpressure is frequently justified on the plea of necessity. We may ask, however, whether it would not be wiser to lengthen the course a little instead of defying the laws of nature in the effort to crowd three years of work into two, or four into three.

In the second place, normal schools could contribute to the hygiene of the profession, and at the same time to the protection of the public, if they would conscien-

tiously undertake a selection in the admission of their students. Before entering upon the training course all candidates should be required to undergo a thorough physical examination made by experts employed by the school itself, — the physically unfit to be rejected. The examination should be repeated each year after entrance, and again when the candidate enters upon regular employment. In most other countries such examinations are given as a matter of course.

In the third place, in order that teachers may be placed in a position to protect themselves from those risks to health and happiness which are sure to be encountered in the practice of their calling, as well as also for the sake of fitting them to act as the health guardians of their pupils, the subject of school hygiene should be raised from its present neglect and given the right of way in the normal-school curriculum. Instruction in the subject should escape its present absurd limitation to the traditional (and sometimes obsolete) laws of heating, lighting, and ventilation, and ground itself upon the newer and infinitely broader conceptions of its bearing and scope.

Finally, the normal school could contribute to the hygiene of the profession by conscientiously refusing to place its stamp of approval on candidates who are careless, ugly-tempered, cynical, and void of sympathy for children. The public is not in position to protect itself against poor teachers who have once been brevetted with the school's diploma. We must stop the stream of undesirables at its source.

Vocational guidance for teachers

The normal school could also profitably engage in the work of vocational guidance of its students. Here the effort would need to go beyond the mere exclusion of the unfit, and include the direction of each candidate into that type and grade of teaching where her strongest qualities would be most effective, and where her weakest would least imperil her success.

Such work will have to be grounded upon a positive body of facts and principles, as yet largely unknown, relating to the psychology of teaching success. Its aim will be to distinguish fundamental traits of teacher-personality necessary for success in various lines of teaching. It will endeavor to place the teacher where she can do the most effective work; in the right grade, in the right subject, with the right sex, and in the most suitable environment generally.

A by no means negligible product of any well-directed effort toward vocational guidance in the normal school will be the cultivation in the young teacher of a spirit of self-study and self-criticism, which throughout her career should point the way to self-improvement, to increased success, and to a wholesome spiritual attitude toward the inevitable vexations of the profession.

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CHAPTER XVIII

WHAT THE WORLD IS DOING FOR THE HEALTH OF SCHOOL CHILDREN

THE purpose of this chapter is to give a brief review of the progress of school health work in various countries. It is hoped that it may convey at least a general impression of the breadth and profundity of a movement which with us, as elsewhere, has developed so suddenly that even intelligent people who happen to be uninformed of its scope and fundamental purposes are likely to conceive of it as only another airy deception to add to the already long list of American school fads.

England

Medical inspection in England was not a growth, but rather a sudden national awakening to the fact of racial deterioration. As late as 1902 there was no adequate system of medical inspection anywhere in the country; now it is universal.

England's interest in physical education and other problems of child hygiene received its first great impulse from the disclosures of the results of conscriptions during the Boer War. The fact that about half of the army volunteers had to be rejected for physical unfitness touched deeply the national pride of England, and

brought a keen realization of the dangers of national decay through the physical degeneracy of the people. Numerous investigations, both governmental and private, were soon launched for the purpose of ascertaining the extent of physical deterioration and of suggesting means for its amelioration.

In 1907 an Education Act was adopted which provided for a compulsory system of medical inspection in all the public elementary schools of England and Wales, a system probably unsurpassed in any other country. The act became effective in January, 1908, and within a year nearly all the 307 educational districts of England and Wales had complied with it.

The important provisions of this act are two in number: (1) medical inspection is made compulsory, and (2) the duty of executing it is specifically imposed upon the education authority. It is provided, however, that the education authority may, if it sees fit, arrange to have the work carried on under its supervision by the public health machinery already in existence. Practically it makes little difference which course is pursued, since it places the responsibility for the conduct of the work upon the education authority.

As interpreted by the Central Board of Education, the aim of the English Education Act is not primarily the medical inspection of children, but their physical and mental improvement. The subject of school hygiene is related in every possible way to the public health work, and is viewed as an integral factor in the health of the nation. Doctors, teachers, and nurses

work together in the closest coöperation. The aim is not merely to improve the health of the children who are weakly or ailing, but in the broadest sense to conserve the health of all children by adapting and modifying the system of education so as to make it fit their needs and capacities.

No other nation, unless it be Japan, has adopted a school medical service with a more rational conception of its true purpose. In her school medical clinics England has boldly undertaken the free medical treatment of her ailing children, heedless of the criticisms of the medical profession. Her school physicians are as a rule full-time officers, highly trained and well paid.

The leading organ of school health in England is the *Journal of School Hygiene*, published since 1910.

Germany

Germany's first school doctor was appointed in 1883, at Frankfort-on-the-Main. By 1905, 100 cities had a total of 598 school doctors, and by 1908, the number had risen to over 400 cities and 1500 doctors.

In Germany, medical inspection of schools has not become a national movement, each of the several states composing the empire acting upon its own initiative. Thus far only two states have a state-wide school medical service for town and country alike, but everywhere there is lively agitation looking toward an extension of the work to rural schools, secondary schools, and private schools of all grades.

German school doctors are nearly always part-time

officials. Even those who are employed for full time may supplement their salaries with private practice. The pay of the whole-time doctors ranges from \$1750 to \$2750, with pension rights. School nurses are not very commonly employed, and the effectiveness of the service suffers greatly in consequence. There are many dental, but few medical, clinics. The school doctor never undertakes to give treatment, and all suggestions in this line meet with vehement opposition on the part of the practicing physicians. As stated by Fürst, "medical inspection in Germany has gone only a little way toward its real goal of medical supervision." In this respect Germany is, with certain exceptions, distinctly behind a number of other countries.

The Wiesbaden plan of medical inspection, which has become the model for many German and American cities, deserves special mention. It provides essentially as follows: —

1. A superficial examination of all new entrants.
2. Following this a thorough physical examination of new entrants takes place within six to eight weeks after the opening of school. The results of the examination are recorded for each child upon an individual "health schedule," a card which contains spaces for the entries of health data secured from all the examinations made during the entire school life of the child. If a child requires continuous medical supervision, the doctor inserts the words "Medical control" at the top of his schedule.
3. Reëxaminations of the same nature occur in the second, fourth, sixth, and eighth years of school life.
4. The school doctor visits each school at least once a month, and each classroom at least once each half-year.
5. All cases of infectious disease coming to the notice of

the head-master must be reported at once to the school doctor, who calls and inspects the class to which the patient belongs. All suspects are sent home, and kept under observation for a few days. Orders for school closure, disinfection, etc., must be sent by the school doctor to the local sanitary authority.

The German method of making the medical examination is of special interest because of its thoroughness, and might well be recommended to American school doctors. As described by Dr. Fürst, it takes place as follows:—

A teacher assists the school doctor by writing on the health schedules at his dictation. The children, who have been previously weighed and measured, approach the doctor in turn, stripped to the waist (including the younger girls). Their general condition is noted, then the chest measurement taken; the neck is palpated, and glandular swellings, enlarged thyroid, etc., are noted. The mouth is inspected, and the condition of the teeth and tonsils, and the presence of adenoids noted. The nasal and aural openings are superficially inspected and, if suspicious appearances present themselves, a more thorough examination of these is made. The back is now inspected, particular attention being paid to the spine; then the head and hair are looked at. Where appearances of illness present themselves, or the child complains of pain, etc., a more thorough physical examination is made, cases which cannot be satisfactorily diagnosed in the presence of the more or less fidgety class being reserved for private examination after the others have been dismissed.

In other ways than by medical inspection Germany affords us admirable examples of what schools can do for the health of their children. Swimming instruction is often obligatory, and school shower-baths are becoming extremely common. In case of serious spinal

curvature, physical exercises of a corrective nature are prescribed by the school doctor, and carried out under his direction. Half-holidays and school journeys are common. Over two hundred cities supply from one to three daily meals to all necessitous school children, municipal grants supplementing private benefactions for this purpose. In the matter of special schools for defectives, Germany leads the world. Up to 1908 such schools had been established in about two hundred German cities. The open-air recovery school, already noted, is only one of the many types of special schools in Germany.

In the amount of productive research, the number and value of its manuals and texts, and in its high-class scientific journals, Germany has contributed far more to the cause of school hygiene than any other country. The following are some of the most prominent German periodicals devoted to school hygiene and related subjects:—

Zeitschrift für Schulgesundheitspflege. Monthly. Founded 1888.

Internationales Archiv für Schulhygiene. Quarterly. Founded 1905.

Das Schulzimmer. Quarterly (1903–10).

Eos. Quarterly. Founded 1905.

Zeitschrift für Krüppelfürsorge. Quarterly.

Soziale Médecin und Hygiene. Monthly.

France

Medical inspection began in France as early as 1834, when a school doctor was appointed for each boys' school in Paris. The service was extended to girls'

schools in 1843. The first school doctors, however, received no salary, and did little real inspection. It was not until 1879, when Paris organized an extensive system, that medical inspection in France could really be said to have begun. From that date the movement spread rapidly to other cities. By the Education Act of 1886 the legal position of medical inspectors was fully established, and at present practically all the cities have a system based more or less intimately on that of Paris.

For many years the work in France was confined almost entirely to sanitation and the prevention of contagious diseases. Only a few cities — such as Nice, for example — have undertaken the careful individual examination of all of their school children, though the attention of French school doctors is rapidly turning to the fundamental problems of child hygiene.

Other notable activities conducted by French educational authorities are school feeding and “vacation colonies.” The latter have recently become extremely popular, so that it is not at all rare for the wealthier communes (districts, or wards) of cities to purchase large estates in the country for the special use of vacation colonies for school children. In choosing the pupils for such excursions preference is given to children who are anæmic, feeble, convalescent from acute illness or pre-tuberculous. Some districts maintain resorts both at the seaside and in the country, the school doctor deciding which place would be of the greatest advantage to a given child.

Mention should be made of the French League of School Hygiene, and also of the Society of Medical Inspectors of Paris and the Seine. Both are active associations, the former publishing the quarterly journal entitled *L'Hygiène Scolaire*, and the latter the monthly organ *La Médecine Scolaire*.

Switzerland

All but a few of the cantons of Switzerland have a well-matured system of medical supervision for the cities, and some of them have extended the work into rural schools as well. The duties of the school doctor usually include the complete sanitary supervision of the school buildings and grounds, and the examination of children for all kinds of defects, debility, and mental deficiency. Both Zürich and Geneva have remarkably efficient school medical service. Lucerne has instituted school medical and dental clinics. The latter registered 3443 attendances in 1908-09.

Owing to the high level of intelligence and education among the people of Switzerland the advice of school physicians is almost invariably acted upon, and an elaborate follow-up service is unnecessary. The Swiss Society for School Hygiene, which enrolls over seven hundred active members, has done effective work in promoting medical inspection, and publishes, besides a Year-Book, *The Swiss Journal of School Hygiene and Child Protection*.

Sweden

In the medical inspection of schools Sweden has long been a pioneer. As early as 1868 all the public secondary schools in the kingdom had medical officers on their staffs. The present code for secondary schools, which dates from 1905, provides for the appointment and remuneration by the Government of at least one medical officer for each school.¹

The method of examination is almost exactly identical with that provided for by the celebrated Wiesbaden plan, and so need not be described in detail.² The duties of the school physician are, however, of decidedly broader scope than in most other countries, in that they include an administrative as well as an advisory function. The school physician is expected to supervise the construction of new buildings; to see that the sanitary arrangements are satisfactory; to draw up a plan of procedure for janitors and other employees, and to see that it is carried out; to exercise constant oversight of the methods of physical education; and finally even to supervise the instruction given in the several branches of the curriculum. We have in this a suggestion of the rapidly broadening scope of educational hygiene.

For the public elementary schools Sweden has not yet established a general system of medical inspection.

¹ It should be noted that Swedish secondary schools correspond to those of Germany, and not to those of the United States.

² See p. 288.

However, all of the larger cities and some rural communities support, on their own initiative, a school medical service similar to that supplied by the Government to secondary schools. Foremost of the Swedish cities in this respect is Stockholm, which maintains a system of examinations similar to those of Wiesbaden and Paris, and in addition has set the notable example of voting public funds for carrying on research in school hygiene. In 1906, the city granted to Dr. C. Sündell the sum of \$495 for the investigation of schoolroom air, in relation to heating and ventilation; \$280 to Dr. J. Hanmar, for the study of fatigue, as influenced by various forms of school work; and \$55 for an inquiry into the influence of vertical and slant writing upon sitting posture. The budget for 1907 included appropriations amounting to \$1375 for investigations relating to school hygiene. Of this, the sum of \$440 was allotted to Dr. Sündell for the study of delicate and anæmic school children, and of the home conditions under which they live; to Dr. Hanmar an equal amount for the continuation of his study of school fatigue; and to Dr. K. Soderling about \$500 for the double purpose of investigating the possibilities of natural lighting of schoolrooms (a difficult problem for a part of the school year in Sweden, owing to the high northern latitude), and the most suitable sizes of children's school desks. The same amount (\$1375) was appropriated for investigations in 1910.

If the educational authorities in all parts of the world were simultaneously to emulate this example by

undertaking similar investigations, many important and challenging problems of school hygiene would soon be brought to solution.

In regard to dental clinics, medical dispensaries, school feeding, and the care of tuberculous children, Swedish schools are on the whole abreast of the most advanced practices in other countries. Medical treatment is provided in many polyclinics and in at least six cities by free dental service.

Denmark

There is no general school medical service in Denmark, and such inspection as has been carried on has been directed mainly toward the control of infectious diseases. However, Copenhagen, Frederiksberg, and a few of the larger provincial towns have undertaken medical inspection on their own initiative, adopting in most cases the Wiesbaden system. Copenhagen has one part-time physician for 2000 to 4000 children, while Frederiksberg, with its 8000 school children, employs one for full time. The Tuberculosis Act of 1905 has led to an excellent and uniform method of janitor service for all state-managed schools.

Norway

Since the Education Act of 1896, Norway has required medical inspection of all its public secondary schools. Since 1889 there has been a permissive law for public elementary schools, in towns which are willing to meet the expense. Most towns now have such

inspection. As a result of the Tuberculosis Act of 1901, special attention is now given to children who appear anæmic or otherwise debilitated.

Scotland

In 1902, while the Boer War was in progress and the British nation was effectively roused to questions of physical degeneracy, King Edward VII appointed a committee of nine to inquire into the state of physical training in the schools of Scotland. The committee was composed of some of Scotland's most eminent statesmen and physicians. There resulted in 1908 the Education Act of Scotland, which conferred upon the 971 school boards the powers necessary for a complete system of medical inspection. While this act is nominally not mandatory, it is so in effect. Practically all schools, whether primary, secondary, or technical, including continuation schools, must either provide for medical inspection or give facilities to the school board. Even private schools may provide medical inspection at public expense. The counties, as a rule, provide the same excellent system as do the large cities.

As in England, the child hygiene movement in Scotland has progressed with almost incredible rapidity. According to a recent provision, all candidates for the teaching profession are required to take a course of training in school and personal hygiene embracing not less than seventy hours. For this purpose seven full-time and two part-time physicians are employed as

lecturers by the four training schools for teachers. The same physicians also medically examine all students in training, both at the beginning and the end of their course. The College of Hygiene and Physical Training, founded by the Carnegie Dunfermline Trust, provides highly qualified special teachers of hygiene. Glasgow and Edinburgh support special schools for physically and mentally defective children, but thus far there are few open-air schools in Scotland. One of the most important of all statistical documents yet published, for the study of the sociology of the school child, is the *Report*, by Dr. W. Leslie Mackenzie and Dr. A. Foster, on *The Physical Condition of Children attending the Public Schools of Glasgow*. The cause of child hygiene in Scotland owes an incalculable debt of gratitude to the pioneer efforts of Dr. Mackenzie.

Ireland

In matters of school hygiene Ireland affords the most shocking conditions to be found in any country which lays claim to civilization. The facts as presented by the most responsible writers and observers sound incredible.

A majority of the buildings are deplorable structures, extremely small, low, thatched but not ceiled, "old, decayed, rat infested, base, and unsightly hovels." Many are filthy, squalid, damp, miserably lighted, and absolutely without ventilation. Sometimes as many as 80 children are crowded into a room 13 × 23 feet, and retained there from 10 until 2 o'clock without

intermission. The atmosphere becomes pestilential and sickening. The seats are universally crude and ill-fitting. One eighth of the elementary schools of Ireland are without toilet conveniences of any kind. There is often no janitor work beyond what teacher and pupils do voluntarily, nor in many schools is there any provision for heating. One third of the schools of Belfast have no playgrounds whatever.

The inevitable results of this neglect appear on every hand. The mortality of school children is higher than for the population generally. Epidemics of measles, scarlet fever, whooping-cough, etc., are frequent. Between the ages of 10 and 15 years the death rate from tuberculosis is appalling, while the relative healthfulness of the children below school age points unequivocally to the cause.

Canada

Ontario passed a permissive act in 1909 and medical service has been inaugurated in Hamilton and Brantford. Manitoba passed a similar act in the same year, and Winnipeg at once availed itself of the legislation. The Province of British Columbia adopted, in 1910, a thoroughgoing medical service for all the city and rural schools.

The city of Montreal has had school medical service since 1906. Interest in the question was first aroused by the Montreal Women's Club, which in 1902 began a campaign of education looking toward this end. After four years of agitation their efforts were successful.

The emphasis is primarily on the prevention of contagious disease and the improvement of sanitation, though the work has incidentally had other favorable results.

Australia

Medical inspection of some kind has been undertaken in most of the Australian provinces. New South Wales has taken up the work in a particularly comprehensive way, laying stress upon the coöperation of teachers.

The results of medical inspection in a country like Australia have special interest, for the reason that they may be expected to afford an index of the influence upon children's health of exceptionally favorable economic and climatic conditions. Thus far the results are no less disturbing than the disclosures brought about by medical inspection in other countries.

Japan

The Japanese, who never do educational things by halves, have one of the most thoroughgoing systems to be found in the world. They rightly regard the school child as the nation's most valuable asset, and consider it a matter of national expediency as well as duty to explore the extent and quality of this resource. Accordingly most of the public schools have been annually inspected by salaried school physicians since 1898. Annual records are made of height, weight, chest circumference, nutrition, and all forms of defectiveness.

The resulting statistics are among the most complete and valuable ever collected.

Other countries

Thus we see that most of the civilized countries of the world have some system or other of school medical supervision. Among others not previously mentioned are Hungary, Austria, Belgium, Holland, Roumania, Bulgaria, Chile, Argentine Republic, South Africa, and even individual cities in such semi-benighted countries as Russia and Egypt.

The United States

Medical inspection of schools in the United States is of very recent growth. Beginning in Boston in 1894, it was taken up by Chicago in 1895, by New York, in 1897, and by Philadelphia in 1898. At least 90 cities had medical inspection in 1907, 337 in 1910, and probably not far from 500 in 1913. This includes practically all of the larger cities and many of the smaller. In 1910 the cities of the country employed 1194 school doctors and 371 nurses, while 48 employed school dentists.

By May, 1911, nineteen States had passed laws providing for the medical inspection of schools. In nine States the laws are mandatory. A few States have since begun the establishment of State Departments of Child Hygiene.

Attention may be called to the following salient facts regarding medical inspection of schools in the United

States: (1) The control is usually vested in the board of education, instead of the public health authorities; (2) of the 301 cities supporting a school medical service, nearly half confine their work to the detection and control of contagious disease; (3) only one State (New Jersey) has a mandatory provision requiring treatment for defects discovered; (4) tests of vision and hearing are usually made by the teachers; (5) the movement is growing with greater momentum each year; (6) the office of school physician is still wretchedly underpaid.

Only sporadic attempts have yet been made in the United States to introduce school feeding or school dentistry. Open-air schools are becoming extremely popular, the number increasing enormously each year. In the way of special schools for defectives we cannot yet match the admirable system of auxiliary schools in Germany, but the movement is being vigorously pushed.

The American Association of School Hygiene was organized in 1907, and has published four volumes of *Proceedings*. Unfortunately we have no journal devoted to school hygiene. It is hoped that the fourth meeting of the International Congress of School Hygiene, which occurred at Buffalo in 1913, will result in increased momentum to our school health reform.

Conclusion

It is surely evident, even from this brief account, that the medical inspection of schools is a movement

of great portent. A little time hence we shall doubtless look back upon the marvelous development of intellectual education of the nineteenth century, and its simultaneous neglect of the body, as one of the strange paradoxes of educational history.

Attention, however, should be called to the fact that in most countries the medical service for secondary schools has been made a matter of slight consideration. It is right that those schools which contain the masses of the nation's children should be provided for first, but similar action should follow for all other types of schools. The old assumption that because children attending the higher schools are usually from a better class of homes, they must therefore be practically free from defect, has been entirely disproved. If it be true, as seems probable, that the secondary schools enroll, on an average, pupils of somewhat more than ordinary native endowment, then so much the more important for them are the things which concern health.

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APPENDIX

SCHOOL HEALTH ORGANIZATION IN VARIOUS CITIES OF THE UNITED STATES

MILWAUKEE

THE Milwaukee School Health Department is maintained by the Board of Education, and has (1913) the following organization:—

One medical director.

Ten assistant medical inspectors.

One specialist on diseases of the eye, ear, nose, and throat.

One full-time dental inspector.

One special assistant for psychological and anthropological tests.

Five school nurses.

The medical director, dental inspector, and nurses, devote their entire time to their work; the remainder of the staff give one half of each day. A central office is maintained where the medical director meets parents, conducts special examinations, and carries on the general office work of the department. A dental clinic for indigent children, an outdoor school, and a school for crippled children, have recently been added. There are four classes for blind children, and four centers for the treatment of speech defects.

The city has been divided into ten geographical districts, nine of which are approximately equal in size and contain about the same number of schools; the tenth, located in the central, or slum, portion of the city, covers less area because the schools are closer together and the conditions met among the pupils worse than in the outlying sections of the city. Each district is under the care of one assistant medical inspector. For the work of the nurses, the city has been divided into five districts, the four outlying territories being about equal, and the fifth in the center of the city, being considerably smaller.

Each school has been supplied with the following materials:—

1. A case for the filing of the doctor's and nurse's records.
2. A circular for the principal, explaining in brief the purposes of medical inspection, his duties in its accomplishment, and information as to causes and time of exclusions.
3. A circular for each teacher, detailing her duties, and giving information as to the early symptoms of contagious diseases.
4. Code cards for all teachers on which all diseases of importance are indicated, by numbers.
5. Blue cards, for requests from teachers for an immediate examination.
6. Psychological examination blanks, with circular of explanation.
7. Physical examination blanks.
8. An emergency case, containing a stretcher, drugs, and dressings.

Complete directions are given to the medical inspectors and nurses in respect to their routine work in the schools. Principals of schools are also instructed in respect to the general plan of health supervision. Indigent children, suffering from physical defects, are referred to the various city dispensaries.

The general plan of examination is as follows:—

A blue card constitutes the request of the teacher for an examination for one of her pupils, whom she suspects of being afflicted with some acute condition requiring immediate care. When the class assembles in the morning, the teacher rapidly inspects her pupils, and if she finds anything abnormal in the appearance of a child she makes out this card. On this card she gives the name, address, school, grade, teacher, date, and reason for sending the child. When the doctor's signal is given, or a monitor informs her of the doctor's presence in the school, she gives the child selected for examination its blue card, and sends it to the room in which the doctor makes his examinations. The doctor examines each child presented, makes his diagnosis, and on the stub attached informs the teacher of his findings, whether the child is to be excluded or not, and, if excluded, for how

long. The card itself is placed on file, and the case followed up by nurse and doctor until cured, when the card is sent to the central office for tabulation. If the case is such that the doctor considers exclusion desirable, a yellow card is made out, giving the cause for exclusion, the date on which the child is to report for reëxamination, and the date of reëxamination and readmission. Attached to this card is a letter form which is sent home in a sealed envelope with the child, informing the parents of the exclusion and the cause.

Each child in the schools receives also a physical examination. The result of this examination is kept on a blank made out in duplicate, and so arranged as to provide for annual records for a period of nine school years. The information recorded on the blank comprises the name, birthplace, sex, age, school, grade, nationality of father and mother, history of measles, scarlet fever, diphtheria, pertussis, date of physical examination, vaccinations, height, weight, nutrition, presence or absence of hypertrophied tonsils, adenoids, defective nasal breathing, defective palate, defective teeth, myopia, hypermetropia, other eye defect, defective hearing, deformities of the spine, trunk or extremities, tubercular lymph nodes, pulmonary, cardiac or nervous disease, chorea, epilepsy or stammering. One copy is sent to the central office and one copy is placed on file at the school, so that the principal and teacher may know the physical condition of each child in the school. When the child is placed under another teacher, either by promotion, demotion, or transfer to another school, the card is presented to this teacher, who is thereby informed concerning any defects which the new pupil may have.

The Milwaukee system is as near ideal as any in the country, and is thoroughly practical and efficient in organization and results obtained. Schools expecting to undertake complete health supervision of their pupils cannot do better than to study the Milwaukee system.

HEALTH ORGANIZATION IN THE MINNEAPOLIS SCHOOLS

This department is organized to include, so far as possible, all matters pertaining directly to the health of the child.

It therefore includes all the physical training activities, gymnastics, folk-dancing, athletics, both high and grade school, those playgrounds that are conducted by the board of education, whatever physical training work is done in the night schools, etc.

The school for stammerers, special classes for children who are mentally retarded and deficient, open-air schools, the school gardens, and the truant schools are also all under the general supervision of the school health department.

The official organization is as follows: —

One medical director (on full time).

Eight assistant medical officers (on halftime).

Eighteen school nurses (on full time).

Twelve instructors in physical training (on full time).

Eighteen playground instructors during the summer months.

One supervising school nurse.

The work of the Minneapolis School Health Department is maintained by the board of education, and is one of the most efficient departments now organized. It is interesting to note with what completeness the divisions of medical supervision and physical education are organized and related in this city.

PHILADELPHIA

Philadelphia, under the management of Dr. Walter Cornell, has recently reorganized its school health work as follows: —

The examination of school children is conducted by the city health department, but the expense is borne by the board of education. Under ordinary conditions this plan could not be recommended, but at present it appears to work satisfactorily in Philadelphia. The school nurses are employed and paid by the board of education.

The scope of the work at present includes: —

1. Routine examination of every child once each year, as required by the state law.
2. Sanitary inspection of school buildings.
3. The detection and exclusion of children suffering from contagious diseases.

4. The examination of absentee children, for the Bureau of Compulsory Education.

5. Special examination of mentally deficient children.

6. Medical supervision of open-air classes for anæmic and tubercular children.

7. Examination of applicants for position of school janitor, and other positions in the department of buildings.

8. Medical supervision of special classes for blind or crippled.

9. The supervision of candies and other foodstuffs sold by vendors around the school premises is being projected, and will soon be put into effect.

OAKLAND

Oakland, California, has had since 1909 an excellent organization under the direction of Dr. N. K. Foster. The plan is in some respects unique, and has given splendid results. It consists of the following: —

One medical director.

One assistant medical officer.

Seven school nurses.

Each nurse has her own particular schools in which to work. At the beginning of the year a special attempt is made to give attention first to those pupils who are urgently in need of it. This is accomplished through the efforts of the teachers and nurses. In this way the worst cases are detected and followed up early in the year, a point of much importance. After this preliminary work is finished, the nurse examines all of the pupils in her district, and sends notices of defects discovered to parents. Follow-up work is done in the case of each child whose parents receive a notice.

An interesting and valuable part of the nurse's work consists in simple "health talks" to the individual pupils, at the time of the physical examination, particularly in relation to the defects or disorders from which they suffer. Health talks are also given the entire classes both by the school nurses and school doctors, and special attention is given to instruction in matters pertaining to sex-hygiene.

A central office is maintained by the board of education

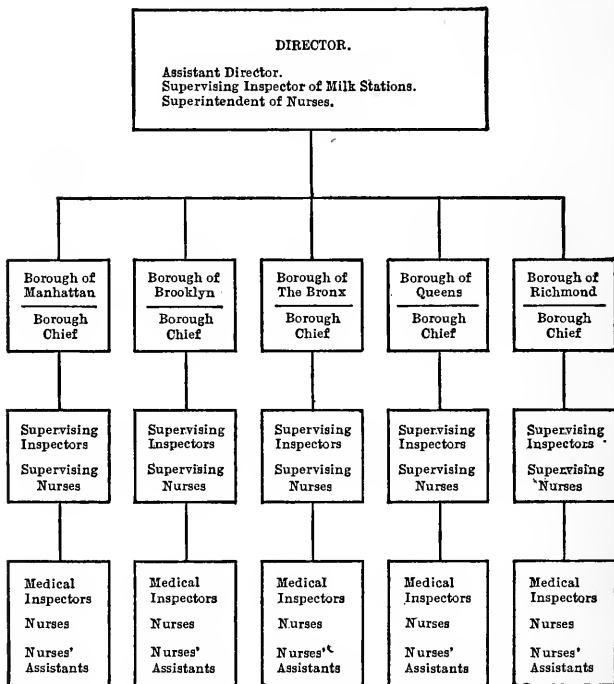
at which the school physicians keep office hours, so that parents may come with their children for special examinations and consultations in respect to further action.

The entire department is maintained by the board of education, and the plan works admirably in every respect.

HEALTH ORGANIZATION IN NEW YORK CITY SCHOOLS

The medical supervision of school children in New York City is maintained under the division of child hygiene of the city board of health. The division of child hygiene was reorganized in 1912, and at present consists of the following plan: —

Organization of the Division



Borough Organization

Borough chief, in each borough. (Directly responsible to the director, and in charge of the indicated borough.)

Supervising inspectors. (Each in charge of a squad of from ten to fifteen inspectors and under the direct supervision of the borough chief.)

Supervising nurses. (Each in charge of a squad of from fifteen to twenty nurses, and directly responsible to the supervising inspectors.)

Medical inspectors.

Nurses.

Nurses' assistants.

Under the subdivision of school hygiene there are employed, in addition to the supervising school medical officers and supervising school nurses, 74 medical inspectors and 179 school nurses. The control of contagious diseases has been placed in the hands of the school nurses, while the medical officers in the schools devote their time to the work of making physical examinations. School nurses treat many of the eye and skin diseases discovered in the schools, while free dispensary treatment is provided for all other cases which cannot receive attention from family physicians and specialists.

Present Procedure

Objects: —

1. The repeated and systematic inspection of all school children for the purpose of early recognition of contagious disease.
2. Exclusion from school attendance of all children affected with an acute contagious disease.
3. Subsequent control of the case with isolation of the patient, and disinfection of the living apartment after termination of the illness.
4. Control and enforced treatment of contagious eye and skin diseases with the purpose of diminishing the number of children excluded from school attendance.
5. Knowledge of unreported cases of contagious disease among school children at home.

6. Complete physical examination of each school child with reference to the existence of any untreated physical abnormality.
7. Education of the parents as to the necessity of obtaining proper medical care for untreated physical defects.
8. Provision for facilities for the treatment of contagious eye and skin diseases and non-contagious physical defects occurring in school children.

The complete system of school medical inspection is carried on in 517 public schools with a registered attendance of 684,207 pupils. In addition, 151 other free schools of the city receive a more or less complete series of inspections for the purpose of detecting contagious diseases. Seventy-four medical inspectors and 179 nurses are detailed to the work of school medical inspection under the immediate supervision of the staff of supervising inspectors and supervising nurses in each borough. Each inspector is assigned to duty in a group of schools with an average registration of nine thousand pupils. Each nurse is assigned to duty in a group of schools with an average registration of four thousand pupils.

Each public school in the city is visited each day by a nurse, except in certain outlying and sparsely populated districts where visits are made at less frequent intervals. Other free schools are visited upon request, or regularly once or twice weekly.

The school medical officers follow the routine indicated in the outline which is given below:—

The diagnosis and correction of non-contagious untreated physical defects:—

1. The medical inspector visits each school under his jurisdiction for two successive days. A regular schedule is maintained, and the principals of the schools are thus informed of the dates of the inspector's visits. The principals are requested to instruct the children to report, in small squads, to the inspector for physical examination.
2. Examinations are made in the following order:—
 - (a) Children entering school for the first time.

- (b) Children especially referred by the principals or teachers.
 - (c) Children belonging to the class to be graduated.
 - (d) In the regular course, beginning with children of the lowest grades, and proceeding to the higher grades in regular order.
 - (e) Classes of the same grade are examined in regular order in each school of the group.
3. Each child is thoroughly examined for the following conditions: —
- Defective vision.
 - Defective hearing.
 - Defective nasal breathing.
 - Hypertrophied tonsils.
 - Tuberculous lymph nodes.
 - Defective teeth.
 - Malnutrition.
 - Pulmonary disease.
 - Cardiac disease.
 - Chorea.
 - Orthopædic defects.

4. A complete record of each physical examination is made on a special form. If a child is normal, the inspector sends such a report to the borough office of the division. If abnormalities are found, the record form is given to the school nurse.

A duplicate record of each child's condition is also placed on file with the child's school record, thus affording to the educational authorities the fullest information in regard to the child's physical condition, and enabling them to take advantage of this information in adjusting the individual curriculum.

The nature and results of the treatment obtained for each defect are thereafter noted upon this school record form by the nurse.

The inspectors and nurses are required to coöperate to the fullest extent with the principals and teachers, giving to them all possible data in relation to the children found to be physically defective, and to offer suggestions in the way of school adjustments which may tend to correct the existing defects.

The cities cited furnish practical information of what is actually being accomplished in some of the representative places of the United States, and will thus indicate to other cities of a similar size how organization may be successfully begun.¹

¹ For an intensive study of the methods and results of medical inspection in twenty-five representative cities of the United States, see Louis W. Rapeer; *School Health Administration*. 1913, pp. 360.

SUGGESTIONS

FOR A TEACHER'S PRIVATE LIBRARY IN SCHOOL HYGIENE

A. GENERAL

(A selected list of sixteen of the best books, which retail for a total of \$30.25.)

1. ALLEN, W. H.: *Civics and Health*. Ginn & Co., Boston, 1909, pp. 411; price \$1.50.
2. AYRES, LEONARD P.: *Open-Air Schools*. Doubleday, Page & Co., New York, 1910, pp. 165; price \$1.00.
3. BRYANT, LOUISE STEVENS: *School Feeding*. Lippincott Co., Philadelphia, 1913, pp. 345; price \$1.50.
4. CORNELL, WALTER S.: *The Health and Medical Inspection of School Children*. Davis Co., Philadelphia, 1912, pp. 614; price \$3.00.
5. CROWLEY, RALPH H.: *The Hygiene of School Life*. Methuen & Co., London, Eng., 1910, pp. 393; price \$1.50.
6. DENISON, ELSA: *Helping School Children*. Harper & Bros., New York, 1913, pp. 352; price \$1.50.
7. DRESSLAR, F. B.: *School Hygiene*. The Macmillan Co., New York, 1913, pp. 369; price \$1.25.
8. GULICK, LUTHER, and AYRES, L. P.: *The Medical Inspection of Schools*. Russell Sage Foundation, New York, 1913, pp. 224; price \$1.50.
9. HOAG, E. B.: *The Health Index of Children*. Whitaker and Ray-Wiggin Co., San Francisco, 1910, pp. 188; price \$.80.
10. HOGARTH, A. H.: *The Medical Inspection of Schools*. Oxford University Press, London, Eng., 1909, pp. 360; price \$1.50.
11. KELYNACK, T. N.: (editor) *The Medical Examination of Schools and Scholars*. P. S. King & Son, London, Eng., 1910, pp. 434; price \$3.00.

12. LELAND, ARTHUR: *Playground Teaching and Playcraft*; price \$2.70.
13. RAPEER, LOUIS W.: *School Health Administration*. Teachers College, 1913, pp. 360; price \$2.25.
14. Terman, Lewis M.: *The Hygiene of the School Child*. Houghton Mifflin Co., Boston, 1913, pp. 450; price \$1.65.
15. Terman, Lewis M.: *The Teacher's Health*. Houghton Mifflin Co., Boston, 1913, pp. 138; price \$.60.
16. *Proceedings of the Fourth International Congress of School Hygiene*, held at Buffalo, 1913, three volumes; price \$5.00. Address Thomas A. Storey, College of the City of New York.

B. THE TEACHING OF HYGIENE

(A selected list of the best books, which retail for a total of \$6.83).

1. GULICK, LUTHER H.: *The Gulick Hygiene Series*. Ginn & Co., Boston. "Two-Book Course," \$1.05; "Five-Book Course," \$2.30.
2. HOAG, E. B.: *Health Studies*. D. C. Heath and Co., Boston, 1909, pp. 223; price \$.60.
3. HUTCHINSON, WOODS: *The Woods-Hutchinson Health Series*, two volumes, Houghton Mifflin Co., Boston; "Book One: The Child's Day," \$.40: "Book Two: Handbook of Health," \$.65.
4. RITCHIE and CALDWELL: *Primer of Hygiene*, and *Primer of Sanitation*. World Book Company, Yonkers-on-Hudson, New York. The two for \$1.08.
5. WOOD and REESOR: *Health Instruction in the Elementary Schools*. Teachers College, New York, 1912, pp. 140; price \$.25.
6. Tolman and Guthrie: *Hygiene for the Worker*. American Book Co., 1912, pp. 231; price \$.50.

GLOSSARY

anæmia, deficiency of blood, or of red corpuscles.

arthritis, inflammation of a joint.

astigmatism, a refractive error of vision due to unequal curvature of the parts of the eye.

atypical, not typical, exceptional.

aurist, a specialist in diseases of the ear.

bacteriology, the department of zoölogy which deals with bacteria.

blood-count, referring to the number of corpuscles per unit measure of blood.

Bright's disease, a disease of the kidneys.

carious, decayed.

cervical glands, the lymph glands of the neck.

chorea, "St. Vitus's Dance."

conjunctivitis, an inflammatory disease of the mucous membrane lining the eyelids.

dentine, the calcified substance which composes the main part of a tooth.

desquamation, peeling-off of the skin.

eugenics, the science of improving the human race

through the application of the laws of heredity.

exhalation, the expulsion of air from the lungs.

fomite infection, the spread of contagious diseases through the medium of articles or things.

hæmoglobin, that part of the red corpuscles whose function is to carry oxygen.

hydrocephaly, a disease characterized by the accumulation of a watery fluid on the brain.

hyperopia, "far sight."

hypertrophied, abnormally enlarged, overgrown.

hyphosis, backward curvature of the spine.

impetigo, a contagious skin disease due to a fungus.

lassitude, weakness or languor.

lymphatic, pertaining to the lymph.

mastoid, that part of the temporal bone situated directly behind the ear.

moron, that grade of feeble-mindedness just below the normal.

myopia, "near sight."

- neurosis**, any nervous disorder.
- oculist**, a physician skilled in treating diseases of the eye.
- optician**, one who makes or deals in optical instruments or glasses.
- oral hygiene**, the hygiene of the mouth.
- orthodontia**, mechanical treatment for correcting irregularity of the teeth.
- otitis media**, acute infection of the middle ear.
- passée**, faded, worn out.
- pediculi capitis**, head lice.
- poliomyelitis**, a disease of the gray matter of the spinal cord.
- polypus**, a tumorous growth on the mucous membrane, as of the nose.
- radiograph**, an X-ray picture.
- rickets**, a nutritional disease of childhood affecting chiefly the bones.
- scabies**, itch.
- scoliosis**, lateral curvature of the spine.
- squint**, cross-eye, or strabismus.
- strabismus**, cross-eye.
- suppuration**, producing pus.
- tie**, a spasmodic twitching of the muscles.
- toxæmia**, a poisoned condition of the blood.
- trachoma**, a contagious disease of the eye involving granulation of the inner surface of the eyelids.
- varicella**, chickenpox.
- Von Pirquet test**, a test for the presence of tuberculosis.

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